A COMPARATIVE STUDY OF HYSTEROSCOPY AND TRANSVAGINAL ULTRA SONOGRAPHY IN THE EVALUATION OF ABNORMAL UTERINE BLEEDING IN REPRODUCTIVE AGE GROUP

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the award of the degree

M.D. OBSTETRICS AND GYNAECOLOGY

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CERTIFICATE

This is to certify that the dissertation titled **COMPARATIVE STUDY OF HYSTEROSCOPY AND TRANS VAGINAL SONOGRAPHY IN THE EVALUATION OF ABNORMAL UTERINE BLEEDING IN REPORDUCTIVE AGE GROUP** submitted by **DR. V. LAKSHIMI** to the faculty of Obstetrics and Gynaecology, The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of M.D. Degree (Obstetrics and Gynaecology) is a bonafide research work carried out by her under our direct supervision and guidance.

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DECLARATION

I hereby declare that the study entitled **COMPARATIVE STUDY OF HYSTEROSCOPY AND TRANS VAGINAL SONOGRAPHY IN THE EVALUATION OF ABNORMAL UTERINE BLEEDING IN REPORDUCTIVE AGE GROUP** was done by me in the Institute of Obstetrics and Gynaecology (IOG), Madras Medical College, Chennai-600 003, during the period of my PG study for MD Branch II Obstetrics and Gynaecology from 2009 – 2011.

This Dissertation to Dr. M.G.R. Medical University is in partial fulfillment of University regulations for the award of MD Degree in Obstetrics and Gynaecology.

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ETHICAL COMMITTEE CERTIFICATE

I, **Dr. V. Lakshmi** apply for the ethical committee certificate for the project of **"Comparative study of Hysteroscopy and Transvaginal Sonography in Reproductive age group abnormal uterine bleeding"** under the guidance of Dr. S. Jaya MD., DGO. Institute of Obstetrics and Gynaecology, Egmore, Chennai-8.

I understand the implications of doing research with human subjects and will fully comply with the regulations and keep the dignity and protect the health of subjects at all costs.

Signature of Postgraduate student

I have no objection to guide this postgraduate student in the project mentioned above. I shall supervise that all the human rights are protected and research is carried on with the utmost humanitarian principles.

Signature of the guide

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Seal of guide

I certify that this project has been presented in front of the Ethical Committee, duly formatted in this institution and that all the members of the Ethical Committee have given permission to conduct this research.

Chairman of Ethical Committee

CHAIRMAN
ETHICAL COMMITTEE
CHENNAI
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Seal of Chairman

Date: 21-12-09

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CONTENTS

INTRODUCTION

Although uterine bleeding is a normal physiologic episodic occurrence for most women, its characteristics nevertheless vary considerably. The broad range of normal variation causes difficulty in identifying abnormal patterns. The problem is that uterine bleeding has a wide range of diagnostic possibilities and confusion is generated when review and reports fail to outline the diagnostic evaluation of the patient who presents with abnormal uterine bleeding patterns.

Goals of clinical management are primarily dependent upon attaining a correct etiological diagnosis. The history, physical and pelvic examination attempt to determine the site of the bleeding and its source. Information gathered from this will suggest what direction the investigation would take. Traditionally Dilatation and Curettage and Ultrasonography were the most common investigations employed in the evaluation of the causes of AUB[1].

TVS is useful in detecting endometrial thickness and morphology as well as the regularity of endo myometrial border, well tolerated by patients but sessile or pedunculated lesions of endometrium and malignant disease cannot be excluded. As an investigation of AUB, it is recommended by RCOG and ACOG in 1994.

Addition of color Doppler and 3D imaging[29] leads to diagnostic accuracy, The use of 3D SHG speeds the procedure and greatly helps in the diagnosis of submucous leiomyomas.

The use of TVS assisted gynecological surgery has emerged as a tool for providing high resolution image of cervical canal and uterine cavity during all the stages of procedure and provides improved indication of the procedure's endpoint.

Hysteroscopy has ushered a new era in the evaluation of AUB. By direct visualization of the uterine cavity it is able to pin point the etiology in the majority of the cases. It can accurately detect endometrial hyperplasia and aids in the early diagnosis of endometrial carcinoma and uterine polyps.

This study conducted at the institute of obstetrics and gynecology Chennai during the year 2009-2010 compares the efficacy of hysteroscopy and trans vaginal sonography in the evaluation of AUB in reproductive age group.

AIM OF THE STUDY

This study conducted at Institute of obstetrics and gynecology Chennai during the year 2009-10 compares the efficacy of hysteroscopy and transvaginal sonography in diagnosing the pathology in patients with AUB. The hysteroscopic and sonographic findings are correlated with the histopathological diagnosis of endometrium obtained by curettage.

REVIEW OF LITERATURE

HISTORICAL REVIEW:

"A vigilant eye in the uterine cavity is better than numerous blind curettages", quoted **Lindmann**[2], about the future of hysteroscopy.

Until the beginning of the 20th century, this possibility existed only for external orifices. **Archigenes of Apameia** already had a grasp of illumination procedures, "et hoc ad clarem lucem siat." Subsequently anal and vaginal specula were developed from simple tubes to more complex instruments for dilatation and observation. Various methods were devised using systems of concave mirrors and lenses, to collect and focus light from natural and artificial sources and direct it into a cavity[2].

History of endoscopy really begins in the early years of the 19th century. In **1805**, **Bozzini** (1773-1809) constructed a device called a light conductor that enabled him to inspect various passages and body cavities. In **1864**, **Aubinais** observed a baby's head emerge from the cervix with a tube he inserted into the vagina, and for this reason he has been described incorrectly as the first hysteroscopist.

The first hysteroscopy (also called as metroscopy or uteroscopy) was described in **1869** by **Pantaleoni**[3]. Polypoid endometrial growths were observed by him. Pantaleoni used reflected candle from a concave mirror to illuminate the uterine cavity.

In **1895 Ernest Bumm** from Germany reported to the Vienna Congress about his experiments with uterine endoscope. He was able to examine changes inside uterine mucosa, granulation, ulcers and growth. Frequent bleeding was a major problem that disrupted his examination of the cavity.

In **1893, Morris**[2] used a straight silver and brass tube. He observed tubal ostia and endometrium. Bleeding and mucous obstructed his vision. So a new type of hysteroscopy was proposed by **Beutner**[5] in **1898** which was equipped with water sprinkler.

In **1907**, **David** demonstrated the first contact hysteroscopy, which was useful for diagnosis of uterine disorders. In **1914, Heineberg**[6] devised a system for irrigating the uterine cavity to rinse off the blood that often covered the lens and hindered the lesion. In **1925, Rubin**[7] insufflated the uterine cavity with CO_2 instead of water. In **1927, Mikulicz-Radecki** and **Freund**[2] collaborated to produce a 'curettoscope' with biopsy taking capability and corneal electro coagulation.

In **1928, Gauss**[8] succeeded in taking intrauterine photography. In **1934, Schroeder** collected important data on the intrauterine pressure during hysteroscopy. He succeeded in developing an instrument with an excellent forward viewing optical system. It thus became possible to inspect large areas of the cavity and to observe three-dimensional views.

Other pioneers of hysteroscopy during these years (**1934-1943**) were **Bank**, **Schack** and **Segond**[9]. **Norment**[10] in 1943 reported a new technique that called for transparent rubber balloon mounted on the tip of hysteroscope and illumination provided by an external light. **Mohri**[11] and colleagues (**1953-1978**) reported on the possibility of embryoscopy and also introduced the first tubaloscope.

Englund[12] and colleagues recommended hysteroscopy for uterine bleeding in **1957**. In **1962, Sinander** studied endometrial carcinoma using silastic balloon. A new era in hysteroscopy began with the introduction of viscous fluid as media for distending the uterine cavity. **Menken**[13] in **1968** used Loviscol, a poly-vinyl pyrrolidine as distension media. **Edstrom** and **Fernstrom** used Dextran (32%); **Lindemann**[14] used CO_2 as distending media in **1972.**

In **1979 Baggish**[15] reported his first experience with contact hysteroscope. In **1981, Hamou**[16] demonstrated microhysteroscope, modern panoramic hysteroscopy with a variation of contact hysteroscopy in a single endoscope. Panoramic hysteroscope and all channel operating sheath was described by Baggish in 1987. Recently Baggish also developed a special dual channel hysteroscope for intrauterine laser surgery[17].

Hysteroscopic operative removal of myoma has been advocated as a more efficacious and safe procedure. Recently most hysteroscopic surgeons have preferred to perform myomectomy utilizing Hyskon as the distending medium, because of its lack of miscibility with blood and optical clarity. Although no hysteroscopic method of tubal occlusion can be accepted as practical at present, it seems reasonable to accept that the hysteroscopic approach remains promising.

M. M. Tahir et al, M. A. Bigrigg et al, J. J. Browning et al, T. Brookes et al, Phillip A. Smith[27] **et al**, conducted a randomized controlled trial in 1999 comparing TVS, outpatient hysteroscopy and endometrial biopsy with inpatient hysteroscopy and curettage. They concluded that TVS and endometrial biopsy can safely be used as the initial investigations in the management of AUB. Hysteroscopy can be used as a second line investigation.

Garuti et al[18] in 2001 conducted a study to estimate the accuracy of hysteroscopy in predicting endometrial histopathology. 1500 women with AUB were studied. Hysteroscopy showed sensitivity, specificity, NPV, and PPV of 94.2%, 88.8%, 96.3%, and 83.1% respectively. Highest accuracy was in diagnosing endometrial polyps, with sensitivity of 95.3%, specificity 95.4%, PPV 98.9% and NPV 81.7%.

Madan and **Al-Jufairi**[19] in 2001 retrospectively studied 556 cases of AUB, who underwent hysteroscopy and D&C. 53, were diagnosed to have endometrial polyps hysteroscopically, however only 13 pts were confirmed to have polyps histologically. Hysteroscopy was highly specific for diagnosis of both endometrial hyperplasia (85%) and endometrial carcinoma (99.5%); however the sensitivity of hysteroscopy for diagnosing endometrial cancer was 40% and 30% for endometrial hyperplasia.

HKCOG GUIDELINES NO. 5 MAY 2001

Transvaginal sonography and endometrial biopsy are the preferred first line methods of assessing the endometrium. Hysteroscopy / Vabra aspiration or hysteroscopy/D&C are the alternative methods of investigation if so required. Routine first line D&C should be discouraged.

Clark[20] in **2002** conducted study on the accuracy of hysteroscopy in the diagnosis of endometrial cancer and hyperplasia. They concluded that diagnostic accuracy of hysteroscopy is high for endometrial cancer, but only moderate for endometrial diseases.

Bain[21] in **2002** evaluated and compared the clinical benefit of additional out-patient hysteroscopy over traditional vaginal examination and endometrial biopsy in unselected pre-menopausal women and 370 women were recruited in the study and he concluded that out-patient diagnostic hysteroscopy is an acceptable procedure and may give more reassurances. It does not influence clinical management, especially with respect to hysterectomy rate. Out-patient hysteroscopy may be useful in selected cases, but when performed in a non-selective manner, it has little influence on clinical management and increases costs.

Gianninoto[22] in **2003** conducted a retrospective study of diagnostic hysteroscopy in AUB and concluded that ambulatory hysteroscopy was shown to be a simple, safe, well tolerated and reliable procedure in the diagnosis of AUB across all age-groups and its wide spread use can drastically reduce the need for conventional curettage, thereby increasing patient satisfaction and lowering costs.

deWit and **Vleugels**[23] in **2003** evaluated 1045 hysteroscopies performed over 6 years retrospectively. Normal cavity was found in 54.2%. Most common abnormal findings were fibroids (21%) and endometrial polyps (14.4%). Hysteroscopically diagnosed hyperplasia of the endometrium was confirmed in only less than half the cases. Endometrial carcinoma was suspected on hysteroscopic view in 2 cases of a total of 7 proven cases. Diagnostic hysteroscopy is a valuable tool in diagnosing structural intra-cavital pathology, very suitable for out-patient clinic.

Jaiswar Shyam Pyari et al, Sachan Rekha et al, Srivastava PK et al, Madhumati Goel et al, Monika Pandey[24] **et al** in **2005** conducted a prospective study at King George Medical University, Lucknow to evaluate the diagnostic efficacy of hysteroscopy, TVS and HPE in cases of AUB. Most common symptoms were menorrhagia (40%), metrorrhagia (18%), menometrorrhagia (14%), and polymenorrhea (14%). Compared to hysteroscopy, TVS had a sensitivity of 78.15%

Epstein E et al, Ramirez A et al, Skoog L et al, Valentin L[25] **et al** in **2005** conducted a prospective study at the university hospital, Sweden to determine the ability of TVS, to detect focal lesions in the

uterine cavity in women with PMB and endometrium > 5 mm, and the accuracy of conventional USG, saline contrast sonohysterography and hysteroscopy to diagnose polyps, myomas and uterine malignancy.

Saline contrast sonohysterography and hysteroscopy both had a sensitivity of approximately 80% with regard to diagnosing endometrial polyps whereas conventional ultrasound had a sensitivity of 49%; false-positive rate, 19%. Hysteroscopy was superior to both with regard to discriminating between benign and malignant lesions (sensitivity, 84%, 44%, and 60%; false-positive rate, 15%, 6% and 10%, respectively).

Mojgan Barati, et al, Sara Masihi, et al, Farideh Moramezi, et al, Shabnam Salemi[26] et al Clinical trial study conducted from **Mar-05 to Mar-07,** at Ahwaz Imam Khomayni hospital., 147 patients with normal TVS entered the study and were considered for outpatient hysteroscopy.

Majority was over 40 years old (96 women). 115 patients (78.2%) had normal and 32 patients (21.8%) had abnormal Hysteroscopic results. 116 patients (78.8%) had normal and 31 patients (21.2%) had abnormal pathologic results; moreover, cervical canal polyp was the most common lesion hysteroscopically and

pathologically in all groups. They concluded that in patients with AUB and normal TVS, hysteroscopy can be used as the second step procedure.

Tajossadat Allameh et al, Fereshteh Mohammadizadeh[28]et al in **2007** conducted a prospective, descriptive analytic study on 105 patients with AUB at the Isfahan University, Iran to define the diagnostic value of hysteroscopy in AUB compared to pathologic findings and showed 100% sensitivity, 80.5% specificity, 88.9% positive predictive value (PPV) and 100% negative predictive value (NPV) and concluded that hysteroscopy can be used as the first line diagnostic method. However hysteroscopy without directed biopsy has insufficient value for diagnosing endometrial hyperplasia.

Alcázar JL et al, Laparte[29] C et al in **2009** conducted a comparative study of TVS and hysteroscopy in post menopausal bleeding at the University of Navarra, Spain, to assess the accuracy of TVS and hysteroscopy for diagnosing endometrial pathology. Considering a cutoff value of < or = 5 mm as normal, TVS showed normal findings in 50% of patients and abnormal in other 50%. Sensitivity, specificity, and PPV and NPV for TVS and hysteroscopy were 100, 60.8, 35.7, and 100% and 100, 89.4, 71.4, and 100%,

respectively. Both methods were highly sensitive, but hysteroscopy was more specific than TVS.

STUDIES ON TRANSVAGINAL ULTRASOUND

Mark H. Emanuel[30] **et al** in **1993** conducted a comparative study to determine the diagnostic value of TVS in patients with AUB.

Findings were compared with the final diagnosis established by diagnostic hysteroscopy and histologic examination. TVS demonstrated a sensitivity of 0.96 and a specificity of 0.89. Its use could be implemented as a routine first-step procedure in patients with AUB, and it selects those in need of further diagnostic evaluation in the case of an abnormal or inconclusive sonogram

Garuti G et al, Sambruni I et al, Cellani F et al, Garzia D et al, Alleva P et al, Luerti M[31] **et al** in **1999** conducted a study in the Hospital of Lodi, Italy, to evaluate the accuracy of hysteroscopy and TVS based on HPE report from endometrial specimen, in menopausal women with uterine bleeding. TVS showed sensitivity of 95.1%, specificity of 54.8% and positive predictive value of 63.7% at a cut-off limit of 4 mm. With a cut-off limit of 8 mm the corresponding figures were 83.8%, 81.3% and 79.4%. Hysteroscopy demonstrated a sensitivity of 96.5%, specificity of 93.6% and positive predictive

value of 92.6%. Hysteroscopy is a more accurate technique than TVS because of better specificity .

Tahir M M[27] **et al** in **1999**, in their randomized control trial concluded that TVS and endometrial biopsy can safely be used as the initial investigation in the management of AUB.

Diaa El-Mowafi et al, Ahmed Farid et al and Ahmed El-Badawi[32] **et al** in **1996** conducted a prospective study at the Benha Faculty of Medicine, Egypt to compare TVS and hysteroscopy with HPE results of D&C.

TVS gave a sensitivity and specificity of 73.9% and 73.7% and a PPV, NPV and efficacy of 77.3%, 70% and 73.8% respectively. Hysteroscopy gave a sensitivity and specificity of 78.3% and 84.2% and a PPV, NPV and efficacy of 85.7%, 76.2% and 81% respectively. This study shows that TVS is easy, relatively cheap, needs no anesthesia and non - invasive it can be used as the first diagnostic step.

JONES, K. D. ET AL, JERMY, K ET AL. AND **BOURNE**[33] **T. H ET AL** IN **2002**

A review study conducted at the 'one-stop' clinic of AUB reported that the combination of TVS with SIS has made ultrasound without hysteroscopy a potential primary diagnostic tool. Compared

FIG : 1 HYSTEROSCOPIC INSTRUMENTS

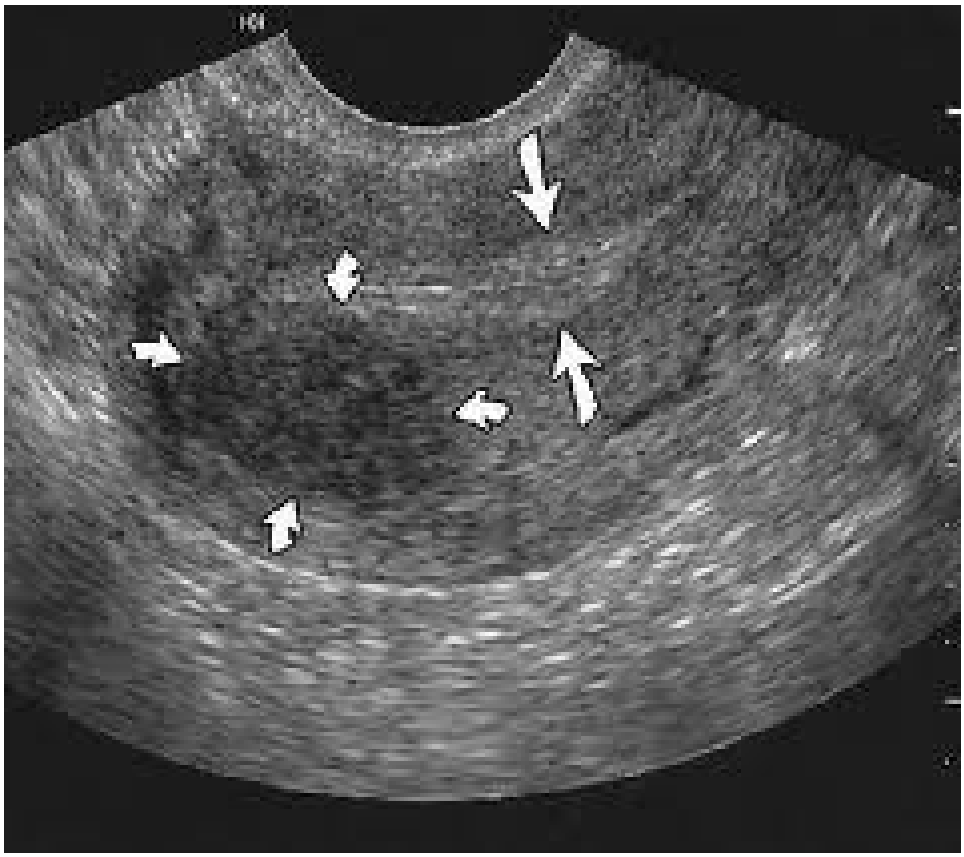


FIG 2: NORMAL TVS PICTURE OF UTERINE CAVITY

with TVS alone, TVS plus SIS increases the sensitivity from 67% to 87%, the specificity from 89% to 91%, the positive predictive value from 88% to 92% and the negative predictive value from 71% to 86%.

HYSTEROSCOPY

Hysteroscopy is a technique in which an endoscope is introduced in the cervical canal and uterine cavity through vagina for visualization of endocervical canal and uterine cavity and fibro optical transmitted light provides illumination, distension of uterine cavity is obtained with appropriate media and video camera attached to the telescope allows monitoring on a television screen with magnification.

INSTRUMENTATION IN HYSTEROSCOPY

1. Optics
2. Distension media
3. Light source
4. Surgical instruments:

- Speculum,Vulsellum,Cervical dilators, Uterine sound, Curette

OPTICS

In most modern endoscopes the illuminating light is carried to the object by an optical fibre bundle.

DIFFERENT TYPES OF HYSTEROSCOPES ARE BEING EVOLVED:

1. **Conventional panoramic hysteroscope** [34]
2. **Contact hysteroscope** [35]
3. **Microhysteroscope**
4. **Portable out-patient hysteroscopes**
5. **Specialised hysteroscopes**

The Flexible Hysteroscope:

The Hysteroser:

DISTENSION MEDIA

Common agents used for distension includes gas and liquids.

GAS: CO_2

The only gas commonly used is CO_2 which has been used since 1920, when it was used by Rubin for tubal perflation.. An intrauterine pressure of 200mm of Hg should not be exceeded and the flow of the gas should be regulated to a limit of 100ml per minute[36].

Advantages of CO_2:

- Relatively nontoxic
- Rapidly absorbed
- Ideal for office hysteroscopy[36]

Disadvantages of CO_2:

- Air bubbles need to be avoided
- Bleeding obscures the field
- Expensive insufflating equipment
- Perfect cervical occlusion required to avoid gas escape[36].

LIQUID DISTENSION MEDIA

Hyskon:

32% Dextran-70 in 10% Dextrose. This solution is too viscous to be instilled by gravity and tends to clog the pump, therefore instilled from 20cc or 50cc syringe.

Advantages:

- Colourless, safe, viscid hypertonic solution.
- Can be used universally with electrosurgical devices, lasers and conventional equipments.
- Immiscible with blood, therefore excellent visualization even during active bleeding. Therefore definite site of bleeding can be known perfectly.
- Unlikely to produce volume overload[37].

Disadvantages:

- Not easily available and expensive
- May precipitate allergic reactions including anaphylaxis
- Instruments needs immediate cleaning because of its solidification on drying
- Difficult through 5mm sheath
- Can cause Pulmonary edema [37]

5% Dextrose[37]

Advantages:

- Easy availability
- Rapid absorption

Disadvantages:

- Not for office use
- Vision not so good
- Large quantity of dextrose is needed
- Retrograde leak
- Miscible with blood

Normal Saline and Ringer lactate[37]:

Advantages:

- Cheap, readily available, non sticky
- Isotonic medium
- Acts as an effective medium when Nd YAG laser or KTP laser, bipolar electrode and mechanical devices are the accessories of choice.
- Requires minimum equipment for satisfactory delivery.

Disadvantages:

- Not to be used with electro surgery because of its electrical conductance.
- Mixes with blood and reduces vision
- Can cause water intoxication
- Retrograde leak is a possibility

Glycine 1.5% and Sorbitol 3% [37]:

- Non viscous, non sticky and clear solutions
- Useful for monopolar electrosurgical devices
- Hypo-osmolar media: can cause acute hyponatremic state
- Does not easily mix with blood
- Metabolites of Glycine are toxic to CNS, causes demyelination
- Intravasation causes nausea, vertigo, high output cardiac failure

METHODS OF INFUSION

1. Pressure cuff: Constant pressure is not maintained as pressure decreases as bag empties
2. Mechanical / Automated pumps: These have pre-adjusted flow rates and pressure settings.
3. Gravity: By mounting the bag on an intravenous pole enclosed in a wide BP cuff inflated to a pressure of 80-100 mm of Hg. Height of the bag determines the pressure.

LIGHT SOURCE

Three general types of light generators are available[38]

- Tungsten
- Metal Halide
- Xenon

INDICATIONS FOR HYSTEROSCOPY [39]

1. Evaluation of unexplained AUB in pre-menopausal or post-menopausal patients.
2. Diagnosis and trans-cervical hysteroscopic removal of suspected sub mucous leiomyoma or endometrial polyp.
3. Location and retrieval of 'lost' IUD or other foreign body
4. Evaluation of primary and secondary infertility including confirmation of abnormal hysterogram
5. Diagnosis and surgical treatment of intra-uterine adhesions.
6. Exploration of endo-cervical canal, internal cervical os and uterine cavity in patients with repeated miscarriages.
7. Evaluation of patients with failed first-trimester elective abortions.
8. Trans-cervical division of small uterine septae.

9. Assessment of uterine wall defects following surgical procedure such as: myomectomy, caesarean section and hysterotomy.

CONTRA-INDICATIONS FOR HYSTEROSCOPY [39]

ABSOLUTE:

1. **Recent or existing uterine infection:** Cervical or uterine infection must be ruled out prior to hysteroscopy. Patients with recent uterine or adnexal infection should not undergo the procedure which could exacerbate an infection.
2. **Pregnancy:** Hysteroscopy should not be undertaken in pregnant patients who desire to continue pregnancy, unless the value of information gained outweighs the potential dangers of infection or pregnancy interruption.
3. **Profuse uterine bleeding:** In patients with excessive uterine bleeding hysteroscopy cannot be performed satisfactorily regardless of the distension medium used.
4. **Cervical malignancy:** Because of the possibility of spreading the disease due to cervical manipulation, patients with known carcinoma cervix should be excluded.

RELATIVE:

1. Adenocarcinoma of endometrium, when the operator is not familiar with this disease
2. Marked cervical stenosis
3. Operator unfamiliarity with instrumentation and technique.

COMPLICATIONS, PREVENTION AND MANAGEMENT[40]

When the appropriate technique and selection of patients are observed, hysteroscopy has practically no complications. However because some blind manipulations are required in sounding the uterine cavity or dilating the endocervical canal, uterine perforation may occur.

1. Uterine perforation:

Perforation of the uterus may occur during sounding of the uterine cavity, during cervical dilatation or when visualization is impaired and the endoscope is forcibly advanced without panoramic vision. The instrument should be advanced gently with delicacy and always under direct vision.

2. Infection:

The appropriate selection, evaluation and screening of patients to undergo hysteroscopy will prevent possible infection. To avoid contamination during procedure sterile techniques should be maintained.

3. Bleeding:

Uterine bleeding may occur, particularly after operative hysteroscopy. If extensive manipulations are performed, bleeding is a usual occurrence and usually subsides spontaneously. Minor spotting may occur after the usual intra-uterine examination, but generally subsides in a few hours.

4. Medium related complications:

These include anaphylactic reactions to dextran and massive intravasation of the CO_2 gas with secondary hypercarbia and acidosis. Arrhythmias may also occur but are unlikely when appropriate instrumentation is used to deliver the CO_2 gas. Inappropriate perfusion of dextrose 5% may produce water overload and electrolyte imbalance. This problem could be prevented easily by controlling and limiting the quantity of fluid and by expediting the procedure.

TECHNIQUE OF HYSTEROSCOPY

Under suitable anaesthesia, patient is put in lithotomy position. After catheterising the bladder, per-speculum and per-vaginal examination is done. Then hysteroscope is introduced into the cervical canal under vision. The cervical canal is examined and the hysteroscope is introduced into the uterus. The tubal ostia are visualized. The endometrial pattern is studied.

ANAESTHESIA

Hysteroscopy requires cervical dilatation particularly when operating endoscopes are used. Therefore some type of anaesthesia is required. General anaesthesia, Paracervical block and Systemic analgesia are commonly used.

ENDOMETRIAL STUDY BY HYSTEROSCOPE

In describing different morphologies 5 well defined criteria are considered[41]:

1) The surface may be smooth (or) rough.
2) The height is constant in normal cases and decreases as nearing the isthmus and ostia.
3) The macroscopic details of the glandular opening.
4) The endometrial vessels.
5) Tubal ostia — the normal ostia are smooth and straight with some parallel mucosal folds.

Proliferative Endometrium[41]:

- The surface is smooth and the colour is white or yellow.
- Height of the endometrium is 2-5 mm.
- Pores of endometrial glands are seen and are situated regularly.

- Superficial vascularisation forms are relatively poor and are seen as interrupted and punctate lines.
- Tubal ostia are normal.

Secretory Endometrium:

- The surface is smooth or slightly rough. The colour varies from yellow to orange
- Height of the endometrium is 5mm-7mm.
- Superficial vessels have typical geometrical pattern mimicking a net.
- Tubal ostia are normal.

Natural Atrophy:

- Surface is smooth and appears as white or yellow.
- Height of the endometrium is less than 1mm.
- Visible glandular openings are absent.
- There is complete absence of superficial vessels though deeper vessels of stroma can be seen
- The tubal ostia are either completely obliterated or seen as fibrous folds.

Hyperplasia (Simple), Adenomatous hyperplasia and Carcinoma In-Situ[42]:

- The surface and colour are variable (white, yellow or even pink)
- The endometrial height is quite uneven correlated with pseudopolypoid aspect and very thick.
- Rich superficial vascularisation is observed with no specific pattern. The endoscopic examination easily provokes hemorrhage.
- Some glandular orifices can be seen. They are no longer well delineated and the regular disposition has been lost.
- Tubal ostia are normal.

Cystic hyperplasia[42]:

- Surface endometrial height and tubal ostia features are identical with hyperplasia.
- Rich superficial vascularisation with the appearance of network is observed, but the pattern is unequal in size.
- Trapped in the meshes of the "net" are several transparent cysts, which of often attain a diameter of several mm. Some are filled with a brown liquid suggestive of intra-cystic hemorrhage.

Polyps, Myomas and Carcinoma[42]:

- Benign endometrial polyps are seen as smooth discrete, shiny & vascular.
- Sub mucous fibroids appear smooth and paler than the rest of the endometrium.
- Endometrial carcinoma appears as irregular lesion, vascularisation with surface ulceration and bleeding.

Cervix:

Cervical canal is seen as circular or oval with a smaller diameter antero posteriorly.

It has a smooth mucous membrane with a whitish appearance different from the lining of the uterus.

Endocervical arborvitae is seen with high magnification.

ABNORMAL UTERINE BLEEDING

Abnormal uterine bleeding is a common clinical problem with myriad causes. A solid knowledge of menstrual physiology and a thorough approach to differential diagnosis can evaluate and manage the problem with confidence.

Menstrual physiology

A brief review of normal menstrual physiology is helpful in understanding abnormal uterine bleeding. The typical menstrual cycle has two phases: Proliferative and Secretory.

The Proliferative phase is characterized by a predominance of estrogen over progesterone and a buildup of endometrium. The Secretory phase begins after ovulation triggers progesterone production. This phase is marked by a reaction to the combination of estrogen and progesterone and stabilization in the thickness of the endometrium.

Menstrual bleeding occurs after secretion of estrogen and progesterone tapers off. Early during menses, thrombin plugs restrain blood loss, but later, vasoconstriction of the spiral arterioles is responsible for hemostasis. When ovulation does not take place, progesterone levels do not rise; therefore, typical cyclic withdrawal of estrogen and progesterone cannot occur.

Normal menstrual cycles are characterized by a cycle length of 28 days (+/- 7 days), a duration of flow of 4 days (+/- 2 days), and a blood loss of 40 mL (+/- 20 mL).

Although trends exist for each type, there are no consistent relationships between abnormal bleeding patterns and their causes[43].

Terminology Used to Describe Abnormal Uterine Bleeding[43,60]

Menorrhagia

Prolonged or excessive bleeding at regular intervals.

Metrorrhagia

A period of menstrual bleeding longer than 7 days or interval bleeding.

Menometrorrhagia

Prolonged or excessive bleeding at irregular intervals.

Polymenorrhea

Regular bleeding at intervals of less than 21 days.

Oligomenorrhea

Bleeding at intervals greater than every 37 days.

Amenorrhea

No uterine bleeding for at least 6 months.

Intermenstrual

Uterine bleeding between regular cycles.

Post menopausal bleeding

Uterine bleeding occurring more than 12 months after the last menstrual period of a menopausal women.

The first step in evaluation of AUB is to make certain that the bleeding is not from a gastrointestinal or urinary source. After this has been ruled out, the condition can be categorized into one of five distinct groups according to its cause[44, 45]:

(1) Complications of pregnancy

(2) Reproductive tract abnormalities

(3) Systemic disease

(4) Iatrogenic factors, or

(5) Dysfunctional uterine bleeding.

1. Complications related to pregnancy[46]:

- Ectopic pregnancy
- Gestational trophoblastic disease
- Placental polyp
- Spontaneous abortion (threatened, incomplete, missed)
- Sub involution of the placental site
- Placenta praevia.

2. Abnormalities of the reproductive tract[46]:

- Benign pelvic lesions
- Adenomyosis
- Endometriosis

- Polyps, cervical or endometrial
- Submucosal fibroids
- Infection
- Malignancy
- Trauma

3. **Systemic disease**[46] **:**

- Hepatic disease
- Coagulation disorder
- Hypothyroidism
- Renal disease
- Thrombocytopenia, von Willebrand's disease
- Hyperprolactinemia
- Cushing's disease
- Polycystic ovarian disease
- Leukemia
- Stress
- Adrenal dysfunction

4. **Iatrogenic factors**[46] **:**

- Anticoagulation therapy
- Contraceptive use
- Intrauterine device

- Levonorgestrol implant (Norplant System)
- Medroxyprogesterone contraceptive injection (DepoProvera)
- Oral contraceptives
- Hormone replacement therapy
- Psychotropic agents

5. **Dysfunctional Uterine Bleeding**[47]

Dysfunctional uterine bleeding (DUB), defined as abnormal uterine bleeding not caused by pelvic pathology, medications, systemic disease or pregnancy, is the most common cause of abnormal uterine bleeding but remains a diagnosis of exclusion.

The cause of DUB is usually related to one of three hormonal-imbalance conditions: Estrogen breakthrough bleeding, Estrogen withdrawal bleeding and Progesterone breakthrough bleeding.

Estrogen breakthrough bleeding occurs when excess estrogen stimulates the endometrium to proliferate in an undifferentiated manner. With insufficient progesterone to provide structural support, portions of the endometrial lining slough at irregular intervals. The usual progesterone-guided vasoconstriction and platelet plugging do not take place, often resulting in profuse bleeding.

Estrogen withdrawal bleeding results from a sudden decrease in estrogen levels, such as occurs following bilateral oophorectomy,

cessation of exogenous estrogen therapy or just before ovulation in the normal menstrual cycle. Estrogen withdrawal bleeding is usually self-limited and tends not to recur if estrogen levels remain low.

Progesterone breakthrough bleeding occurs when the progesterone-to-estrogen ratio is high, such as occurs with progesterone-only contraceptive methods. The endometrium becomes atrophic and ulcerated because of a lack of estrogen and is prone to frequent, irregular bleeding.

EVALUATION OF AUB

HISTORY TAKING

PHYSICAL EXAMINATION

DIAGNOSTIC TESTING

PREMENOPAUSAL WOMEN[48]

If the reproductive-age woman is not pregnant and has a normal physical examination, AUB is usually dysfunctional in nature and can be managed with hormonal therapy.

ANOVULATORY BLEEDING

Anovulation is the most common cause of DUB in reproductive-age women and is especially common in adolescents. Up to 80 percent of menstrual cycles are anovulatory in the first year after menarche. Cycles become ovulatory an average of 20 months after menarche. If anovulatory bleeding is not heavy or prolonged, no treatment is necessary. If the adolescent is distressed by the irregularity of her menses or has been anovulatory for more than a year, oral contraceptive pills are the treatment of choice[47].

Some women still have anovulatory cycles after the hypothalamic-pituitary axis matures. Serum levels of thyroid-

stimulating hormone and prolactin should be measured to exclude significant pathology. Weight loss, eating disorders, stress, chronic illness or excessive exercise may all cause hypothalamic anovulation.

Another cause of anovulation is polycystic ovarian disease, which is usually associated with obesity, increased circulating androgens and insulin resistance. Excess androgens are converted to estrogen in peripheral tissues. This unopposed estrogen state increases the risk of endometrial hyperplasia and cancer. Some women with chronic anovulation do not fall into any of the above categories and are considered to have idiopathic chronic anovulation.

All causes of anovulation represent a progesterone-deficient state. Treatment options include exogenous progesterone every three months to protect against endometrial cancer, oral contraceptives or, if pregnancy is desired, ovulation induction with clomiphene.

OVULATORY DYSFUNCTIONAL BLEEDING

Although less common than anovulatory bleeding, ovulatory DUB may also occur. DUB in women with ovulatory cycles occurs as regular, cyclic bleeding. Menorrhagia may signify a bleeding disorder or a structural lesion, such as uterine leiomyomas, adenomyosis or endometrial polyps. Up to 20 percent of adolescents who present with

menorrhagia have a bleeding disorder such as von Willebrand's disease. Liver disease with resultant coagulation abnormalities and chronic renal failure may also cause menorrhagia.

Polymenorrhea is usually caused by an inadequate luteal phase or a short follicular phase. Oligomenorrhea in an ovulating woman is usually caused by a prolonged follicular phase. Intermenstrual bleeding may be caused by cervical disease or the presence of an intrauterine device. Midcycle spotting may result from the rapid decline in estrogen levels before ovulation[47].

An endometrial biopsy should be considered early in the evaluative process of women who have a history of prolonged exposure to unopposed estrogen, who do not respond to initial management strategies or who are over age 35.

CHARACTERISTICS OF OVULATORY AND ANOVULATORY CYCLES[47]

Ovulatory cycles

1. Regular cycle length
2. Presence of premenstrual symptoms
3. Dysmenorrhea

4. Breast tenderness
5. Change in cervical mucus
6. Mittleschmertz
7. Biphasic temperature curve

Anovulatory cycles

1. Unpredictable cycle length
2. Unpredictable bleeding pattern
3. Frequent spotting
4. Infrequent heavy bleeding
5. Monophasic temperature curve

PERIMENOPAUSAL WOMEN

As women approach menopause, cycles shorten and often become intermittently anovulatory. These changes are the result of a decline in the number of ovarian follicles and in the estradiol level. As follicles decrease in number, the level of follicle-stimulating hormone needed to stimulate ovulation increases.

EXCLUDING ENDOMETRIAL CARCINOMA[48]

All perimenopausal women with persistent AUB should be evaluated for the presence of endometrial hyperplasia or carcinoma. Endometrial biopsy is the most widely used and best studied method of excluding endometrial carcinoma in this age group. In women with normal findings on biopsy, treatment usually consists of monthly progesterone withdrawal or low-dose oral contraceptives. If bleeding continues despite hormonal therapy, further investigation is warranted.

HYSTEROSCOPY

Hysteroscopy with biopsy allows visualization of the endometrial cavity and is regarded as the "gold standard" for endometrial assessment. Diagnostic hysteroscopy can be performed in an office setting and requires no anesthesia or sedation. Operative hysteroscopy utilizes a rigid scope with a fluid distending medium and

is useful for diagnosis and treatment. Before hysteroscopy was available, curettage was the primary method of evaluating AUB. Curettage, however, renders endometrial sampling blind and incomplete, so the diagnostic accuracy of curettage is less than that of hysteroscopy.

POSTMENOPAUSAL WOMEN

The most serious concern in postmenopausal women with AUB is endometrial carcinoma. Of all postmenopausal women with bleeding, 5 to 10 percent are found to have endometrial carcinoma. Other potential causes of bleeding are cervical cancer, cervicitis, atrophic vaginitis, endometrial atrophy, submucous fibroids, endometrial hyperplasia and endometrial polyps[48].

HORMONE REPLACEMENT THERAPY

Women receiving hormone replacement therapy often presents with abnormal bleeding and, of these, 30 percent have uterine pathology. Other causes include cervical lesions, vaginal pathology or the hormone therapy itself. Women receiving sequential hormone replacement therapy may experience midcycle breakthrough bleed resulting from missed pills, medication interactions or malabsorption. If unscheduled bleeding occurs in two or more cycles, further evaluation is indicated[48].

ENDOVAGINAL SONOGRAPHY

Endovaginal sonography is performed employing an endovaginal transducer probe. Usually a probe with acoustic frequency of 5 MHz is employed. Due to improved resolution of the high frequency transducer and the proximity of the probe tip to the organ imaged, endovaginal sonography has been found to provide better visualization of the pelvis and perfect clarity of hollow organs as well as adjacent structures.

MERITS

It gives a magnified but clear picture of the individual pelvic organs and hence the morphology can be studied in detail.

Vaginal sonography is performed with the empty urinary bladder. Hence the discomfort and time required for a full urinary bladder could be totally avoided.

The possibility exists to perform endovaginal sonographic inspection immediately after the bimanual pelvic examination and even simultaneously.

LIMITATIONS

The examination is impossible with an intact hymen or with a very narrow vagina. Hence trans abdominal approach should be preferred for pediatric and adolescent subjects same is true for subjects with congenital anomalies of the genital tract where vaginal introduction of the probe is difficult. The penetration is only 10 cms hence associated pedunculated myoma or ovarian masses which are bigger in size, may not be delineated properly.

METHODOLOGY

The best position for the patient for endovaginal sonography is dorsal position with the legs flexed as it is for bimanual pelvic examination or lithotomy position. A condom or glove is slipped over the probe before examination for reasons of hygiene and readiness for the next patient. A small amount of coupling gel is applied to the inner surface of the tip of the probe before applying the condom or glove and this is to ensure contact and to eliminate the air pockets that could intervene. The tip of the scanner probe is placed adjacent to the anterior fornix (or to the posterior with retroverted uterus) for an evaluation of the uterus and cervix.

With endovaginal scanning the uterus can be imaged in 3 different scanning planes.

1. Sagittal or long axis views
2. Semi-coronal views
3. Semi-axial views

First the endometrium is imaged in its long axis by gently angled sagittal scans through the uterus with the probe head in the region of uterine cervix. Next the endometrium is imaged in its short axis in semi-coronal or semi-axial planes by turning the probe approximately to 90 Deg.

ENDOMETRIAL STUDY BY ENDOVAGINAL SONOGRAPHY

Due to the increased proximity of the endovaginal probe to the uterus and hence to the endometrium, endovaginal approach gives an excellent opportunity to study the endometrium very closely. A very clear and magnified view of the endometrium provided by the high frequency transducer permits precise evaluation of endocrine response of the endometrium and help to diagnose endometrial pathology.

Normally the uterine cavity is empty and hence it is represented by the two layers of endometrium in apposition and the sonographic appearance is that of a clear echogenic line.

MENSTRUAL ENDOMETRIUM

The endometrial cavity is filled with small echo-free spaces suggesting the presence of blood cots. The endometrial lining will be thin and relatively less echoic.

PROLIFERATIVE ENDOMETRIUM

The growth of the endometrial glands and stromal oedema is identified in the form of gradually increasing thickness of the endometrium. During the mid-proliferative phase the hypoechoic area surrounded by echogenic line widens due to increasing stromal oedema. In the impending pre-ovulatory period, the stromal oedema is maximal. This results in significant widening of echofree zone and intense echogenicity of the endometrial lining. The endometrial thickness increases gradually from 2-3 mm in early proliferative phase to upto 8-10 mm in late proliferative phase.

SECRETORY ENDOMETRIUM

During the luteal phase, the secretions of the glands are discharged into the lumen of the endometrial cavity. This is recognized at scan in the form of an echo-free endometrial cavity being lined by thick and relatively echogenic endometrium. During mid-secretory phase there is regression of endometrial glandular

elements and prominence of stromal cells. This leads to increased thickness of the endometrium which becomes more echogenic. During the late secretory phase there is prominence of stromal cells which gives a strong echogenic fluffy appearance to the endometrium and also adds to the thickness of the endometrium. The endometrial thickness can increase to 10-14 mm during the secretory phase.

HYPERPLASTIC ENDOMETRIUM

Hyperplastic endometrium has characteristic unmistakable picture by sonography. The intensely echogenic and thick endometrium surrounded by echo free periphery is quite diagnostic. The endometrium thickens and becomes pseudopolypoid in configuration. In these patients, thickening of the endometrium beyond what is expected for women of comparable age is detected. In perimenopausal women endometrial thickness greater than 14 mm should be considered for further evaluation, whereas in the post-menopausal women endometrial thickness more than 5 mm should be considered abnormal.

ATROPHIC ENDOMETRIUM

The hypo oestrogenic endometrial status is clearly demonstrated by a thin echogenic line and a relatively smaller uterine size. This picture is usually encountered in post menopausal subject.

DILATATION AND CURETTAGE

This is the commonest gynecological operation. It can be diagnostic, to study the pattern of endometrium in menstrual problems and can be therapeutic, if there is continuous uterine bleeding of dysfunctional type. (**Vow et al 2007**). It detects benign pathology in about 80% of patients with menstrual dysfunction. It is the most likely procedure to detect the problem when pathology affects the endometrium globally. It is most frequently done as an adjuvant procedure to hysteroscopy (**Epstein et al 2001**)

TIMING OF ENDOMETRIAL BIOPSY

In order to obtain the maximum information from an endometrial biopsy, it is important for the clinician to provide accurate and complete clinical details and secondly for the sample to be taken at the optimum time and from the appropriate site in the uterus. Request form should provide the date of LMP, use of any steroid hormones, mode of contraception, use of any drugs which are known to interfere with the normal secretion of trophic hormones, menstrual history, and details of any endocrinological disease.

Endometrial biopsy should be taken from anterior or posterior wall in the uterine body, where cyclical changes are likely to be more.

Uterine isthmus fails to undergo cyclical changes and common error of the inexperienced surgeon is to sample, the endometrium too low down in the cavity.

Basal endometrium fails to show normal cyclical changes and therefore the immediately post menstrual biopsy may fail to provide useful information. In patient's with IUD, removal of tissue from the contact site may give false impression of infection, irregular ripening, scarring. Pathological process may be identified at any time for example hyperplasia and neoplasms. Best time for observing cyclical changes in between 7th and 11th post ovulatory days.

Disadvantages of D &C

- Only 70-80% of the endometrium can be curetted
- Polyps and submucous fibroids are frequently undetected by curettage alone.

ENDOMETRIAL ASPIRATION CYTOLOGY

Recently thin plastic cell samplers have been developed (Skarr Land 1986) which provide a histological sample without the need for dilatation or anaesthesia. Several makes are available, including the Gravlee jet Washer (Gravlee 1969), the Issac's sampler (Issac &wilhoite1974) and the Pipelle. The vabra aspirator usually provides

a greater amount of tissue for analysis and is probably no less efficient in diagnosing endometrial malignancy than D &C (Grimes 198)

TRANSVAGINAL SONOHYSTEROGRAPHY

Randolph in 1986 first described the use of intrauterine saline infusion during preoperative transabdominal USG evaluation to detect intrauterine abnormalities. Diechert et al in 1988, first demonstrated that transvaginal sonohysterography was useful in diagnosis of endometrial lesions. This contrast transvaginal scanning with fluid in endometrial cavity or air may improve the reliability of transvaginal ultrasonography. It can evaluate the symmetry of endometrial wall thickness and delineate any intraluminal masses. The combination of endometrial biopsy and transvaginal sonohysterography positively correlated with surgical findings more than 95% and 96% respectively. (**Dubinsky L Ahuy- Gazzehy. Stroehlein K**. done in **Mar-98)**. No patients with endometrial hyperplasia or cancer were misdiagnosed.

Treatment options for Dysfunctional Uterine Bleeding[46]

Premenopausal:

- Oral contraceptives: Low dose (35mcg) monophasic or triphasic oral contraceptives can regulate cycles while providing contraception.
- Medroxyprogesterone: (10mg/day for 10 days) If contraception is not an issue, it can be used to regulate cycles. In a woman who has amenorrhea or oligomenorrhea, medroxyprogesterone every 3 months can protect against endometrial hyperplasia. Intra Uterine device containing levonorgestrol reduces blood loss by 95%.
- Clomiphene: (50-150mg/day on days 5 to 9) can induce ovulation in a woman who desires pregnancy.

Perimenopausal:

- **Medroxyprogesterone:** (10 mg per day for 10 days) May use monthly to regulate bleeding patterns.
- **Oral contraceptives:** (20-µg) Can continue oral contraceptives until a woman has finished menopause and then change to HRT. (May be a relative contraindication in women >35 years of age and who smoke)

Postmenopausal (receiving HRT):

- **Cyclic HRT:** Consider increasing the progesterone dose if early withdrawal bleeding occurs. Increase the estrogen dose if intermenstrual bleeding is present.

- **Continuous combined HRT:** May increase the estrogen dose for 1 to 3 months to stabilize the endometrium. May also try increasing the progesterone dose. If bleeding continues, consider changing regimen to cyclic HRT or using a different type of estrogen.

CONSERVATIVE SURGERIES

1. Endometrial Ablation Techniques

A. Non Hysteroscopic Endometrial Ablation

a. Thermal Balloon

b. Cryotherapy

c. Direct instillation of heated saline

d. Microwave endometrial ablation

e. Radio frequency electromagnetic energy (Corson etal, O.Connor, Magos)

B. Using Hysteroscopic guidance

a. Nd. yag laser

b. Trans cervical resection of Endometrium

c. Roller ball coagulation

d. Radio frequency induced thermal endometrial ablation.

Hystrectomy is the last resort when all modalities of treatment fail.

MATERIALS AND METHODS

SOURCE OF DATA

The present study "A comparative study of hysteroscopy and transvaginal ultra sonography in the evaluation of AUB in reproductive age group" is a prospective study which was undertaken at the Institute of obstetrics and gynecology, Chennai.

Fifty patients with clinical diagnosis of AUB were selected at random from the Gynecology Out Patient Department of the Institute of obstetrics and gynecology Chennai. The age group of the selected patients ranged from 20 to 40 years. Almost all the patients belonged to Socioeconomic classes IV or V.

All the patients underwent TVS, Hysteroscopy followed by curettage and removal of abnormal lesions like Polyps and Submucous fibroid and the material was sent for histopathalogical analysis. The period of study was from Aug-09 to Aug-10.

METHOD OF COLLECTION OF DATA

Inclusion Criteria

i. Age

Patients with age group in the range of 20 to 40 years with AUB were selected.

ii. Parity

The study included only parous women with abnormal uterine bleeding.

iii. General condition of the patient

Patients who do not have any other medical or surgical complications and who do not require any emergency management were selected for this study.

Exclusion Criteria

i. Patients with severe anemia due to menorrhagia were excluded from the study since they required immediate intensive care.

ii. Patients with profuse bleeding were also excluded from the study since they required emergency therapeutic curettage.

iii. Patients with medical complications like uncontrolled diabetes mellitus or hypertension were also excluded from the study to preclude any anesthetic or surgical risks during hysteroscopy.

iv. Nulliparous patients with dysfunctional uterine bleeding were also excluded from the study.

A thorough history was taken and recorded from all the patients thus selected.

These patients were then subjected to a general and bimanual pelvic examination. The following baseline investigations were performed on all patients.

- Urine examination for albumin, sugar and deposits.
- Blood Hemoglobin estimation (in gm%), grouping, typing, BT, CT
- Electrocardiography for patients above the age of 35 years and x-ray for anesthetic fitness

Anesthetic assessment was made on the day of admission. The patients were advised to have a light dinner before 10.00 pm on the night prior to hysteroscopy. The patients were prepared as for any

other surgical procedure. The next day, prior to hysteroscopy an endovaginal sonography was performed on all these patients.

ENDOVAGINAL SONOGRAPHY

The patients after emptying her bladder were put in dorsal position. The probe covered by a condom was inserted into the introitus after gentle separation of labia majora by the examiner's fingers and downward pressure on the posterior commissure of the labia minora.

The following points were noted during endovaginal sonography.

I. Thickness of the endometrium

II. Stromal oedema-represented by clear echo free space surrounding the periphery of the echogenic endometrial line

III. Any other uterine or adnexal pathology which could not be detected clinically.

After endovaginal sonography the patient was wheeled to the theater where hysteroscopy and dilatation and curettage were performed.

FIG 3: TVS PICTURE OF ENDOMETRIAL POLYP

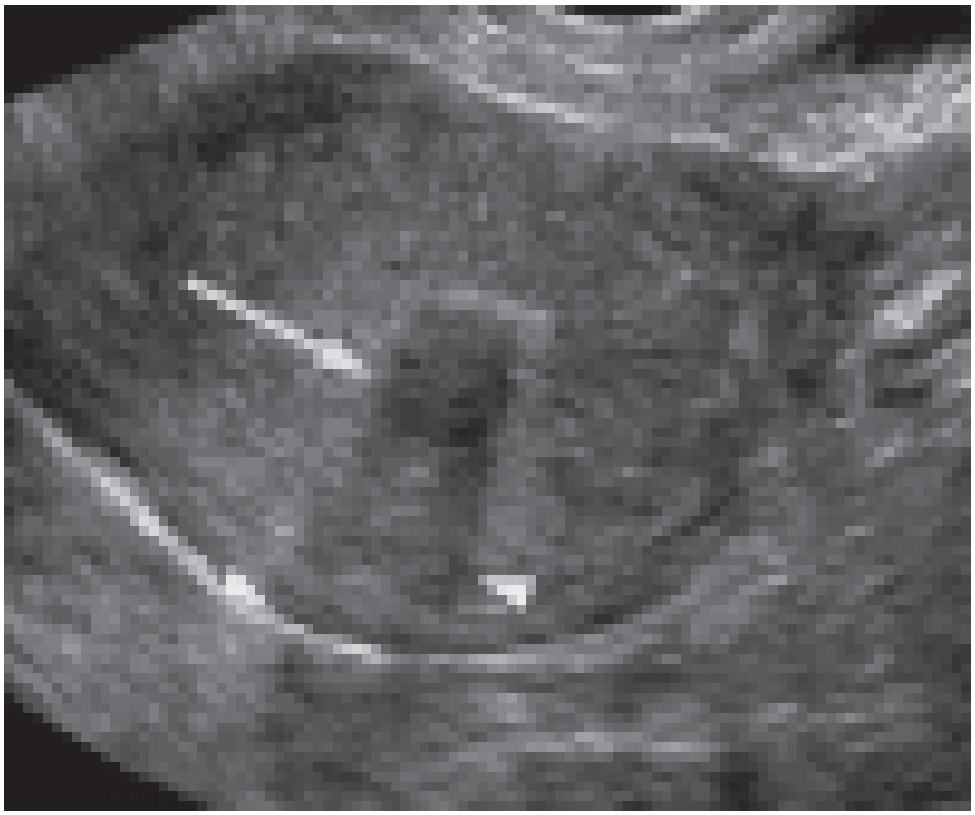


FIG 4: TVS PICTURE OF SUBMUCOUS FIBROID

HYSTEROSCOPY

The patient was examined and re-assessed by the anaesthetist in the theater. After a routine examination which included vital data such as temperature, pulse, Blood pressure and cardio vascular and respiratory system examination, patient was put in lithotomy position. The part to be examined was cleaned with antiseptic solution. Draping was done.

In this study the hysteroscopy was performed under intra venous ketamine anesthesia.

ANESTHESIA

Route

Intravenous

Drugs Used

i. Ketamine hydrochloride 2 mg/kg

ii. Diazepam 10 mg

iii. Atropine 0.6 mg

EFFECTIVE PERIOD

15.20 minutes

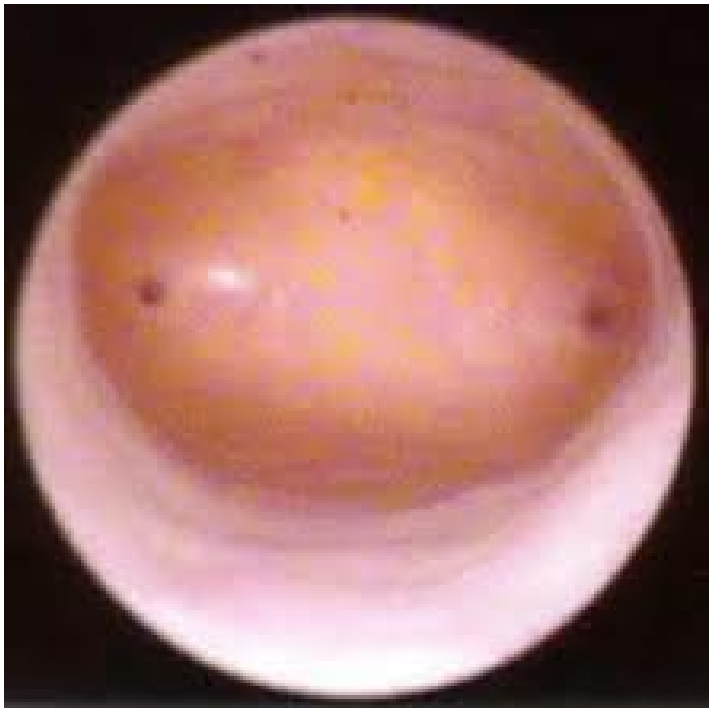


FIG: 5 HYSTEROSCOPIC VIEW OF NORMAL UTERINE CAVITY WITH TUBAL OSTIA

FIG 6 : HYSTEROSCOPIC VIEW OF SUBMUCOUS FIBROID

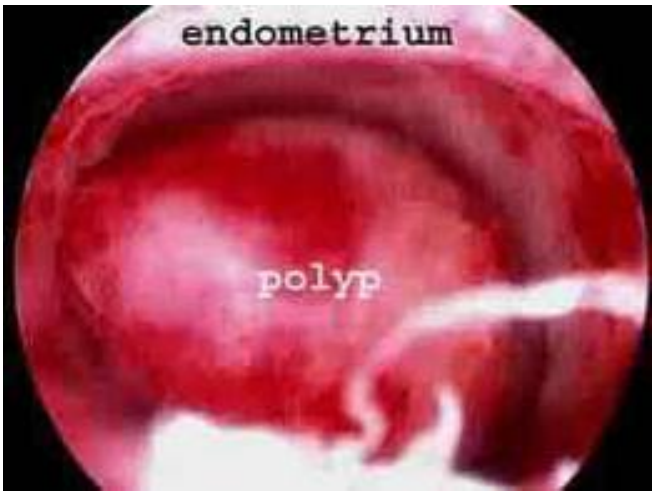
HYSTEROSCOPE – KARL STORZ (GERMANY)

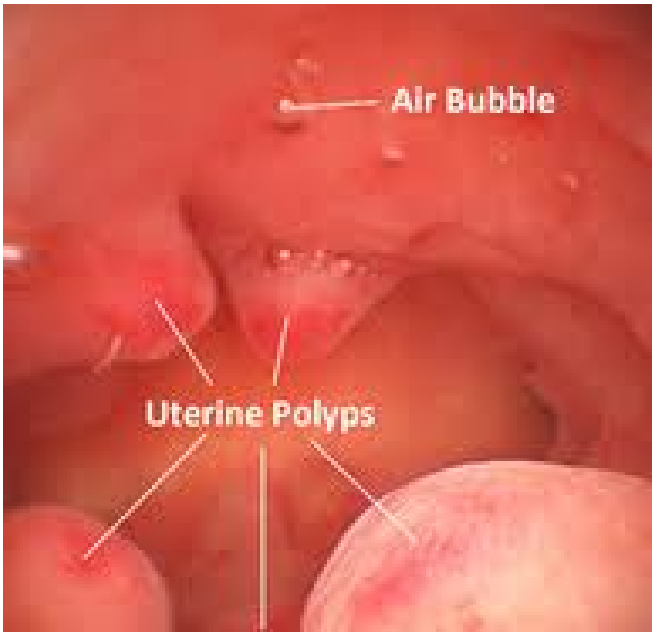
Telescope used was 4 mm, 30 Deg, fore-lens with a 5mm sheath. Illumination provided by fibre optic cable.

INSTRUMENTS

1. Speculum,
2. Vulsellum,
3. sponge holding forceps,
4. Distending medium- normal saline with a drip set and insufflation cuff.
5. D&C set with Hegar's dilators.

Under anaesthesia after catheterising the bladder a bimanual pelvic examination was done. After introducing sim's speculum, the anterior lip of the cervix was caught with vulsellum. After measuring the length of the uterine cavity , the internal os was dilated upto 7 Hegar's dilator which was sufficient in most of the patients. A hysteroscope was introduced into the cervical canal under vision. The inflatable cuff surrounding the distending medium was inflated to 100 mm of Hg and maintained between 80-100 mm of Hg. The drip set attached to the distending medium was attached to the inflow channel of the hysteroscope. The uterine cavity was attached to the inflow channel of the hysteroscope. The uterine cavity was examined and the





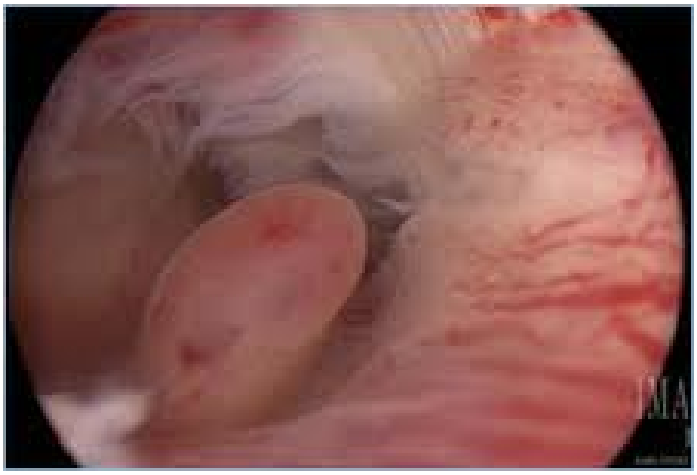


FIG 7 : HYSTEROSCOPIC PICTURES OF ENDOMETRIAL POLYPS

following points were noted. The nature of surface and colour of the endometrium were noted. The glandular opening and vascular pattern were studied. The uterine cavity was examined for presence of any other abnormalities. The tubal ostia were visualized. Any blood clots present in the cavity will be rinsed off by the fluid used as distending medium. The time taken for the procedure and amount of fluid used were noted carefully at the end of the procedure.

DILATATION AND CURETTAGE

Under same anesthesia endometrial curettage was done and curettings were sent for histopathogical examination. The lesions like polyps and submucous fibroids were removed at the same sitting and specimen was sent for HPE.

After the procedures were over, the patients were shifted to post- operative ward where they were kept under observation for 24 hrs.

COMPLICATIONS

The following complications were noted following hysteroscopy.

I. 3 out of 50 patients had bleeding from the cervical lip (trauma produced by vulsellum) which required tight packing for 6 hours and careful monitoring for vaginal bleeding in the post operative period.

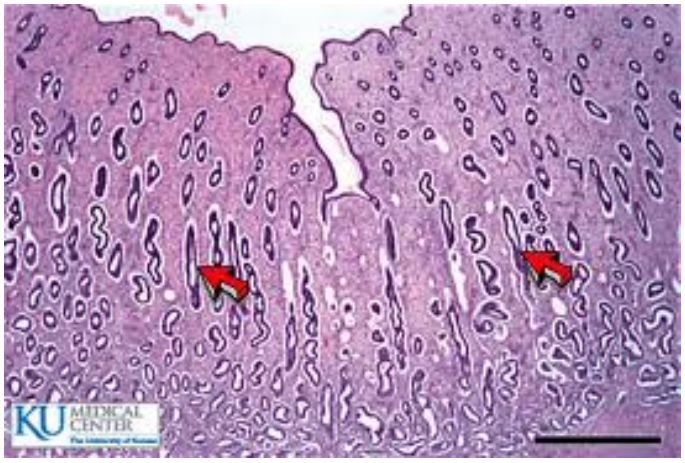


FIG 8 : SLIDE SHOWING PROLIFERATIVE PHASE – ENDOMETRIUM

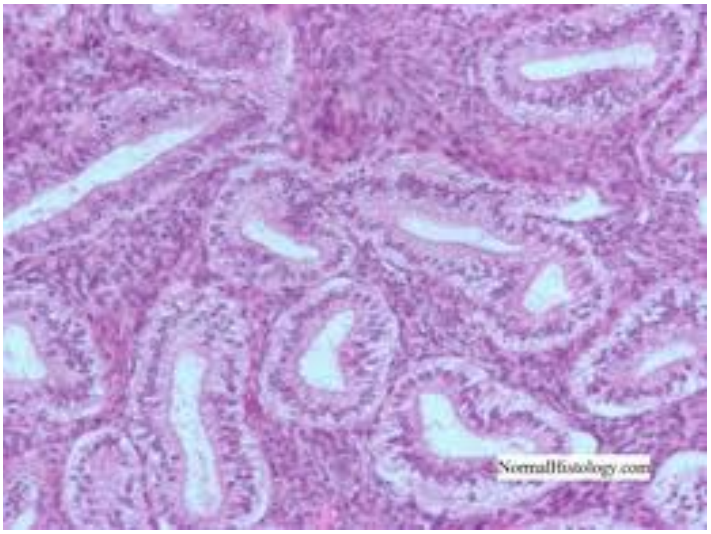


FIG 9 : SLIDE SHOWING SECRETORY PHASE - ENDOMETRIUM

II 8 patients had vomiting mainly due to anesthetic drugs which subsided after symptomatic treatment

III There was no infective morbidity in the present study. Similarly fluid overload and electrolyte disturbance were also not encountered in the present study. The complications following endovaginal sonography were nil.

DURATION OF HOSPITAL STAY

All the patients had minimal hospital stay only for three days.

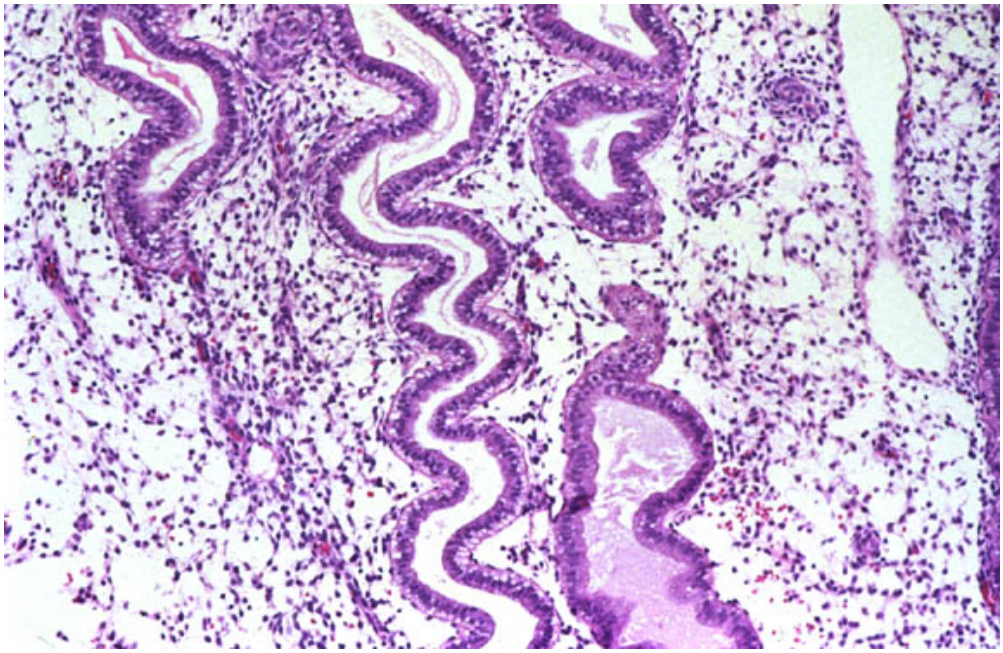


FIG 10 : SECRETORY PHASE - ENDOMETRIUM

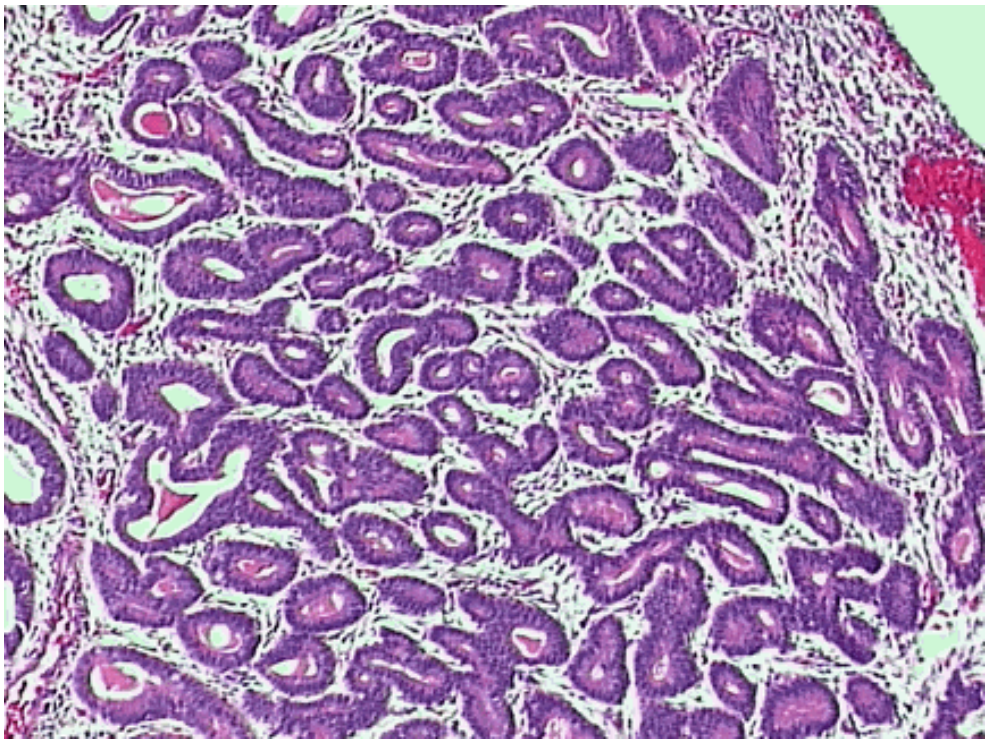


FIG 11 : HYPERPLASTIC ENDOMETRIUM

RESULTS AND ANALYSIS

This study conducted at the Institute of Obstetrics and Gynecology, Chennai during the period of 2009-10 compares the efficacy of Hysteroscopy and Transvaginal ultra Sonography (TVS) in the evaluation of AUB in reproductive age group. The Hysteroscopic and Sonographic findings are correlated with histopathological diagnosis of endometrium obtained by curettage.

Total number of patients selected: 50

Table 1: Age Group

AGE GROUP	Number	%
20-25	16	32.0
26-30	20	40.0
31-35	9	18.0
36-40	5	10.0
Total	50	100.0

Among the reproductive age group, patients in the age group of 26 – 30 constitute 40%.

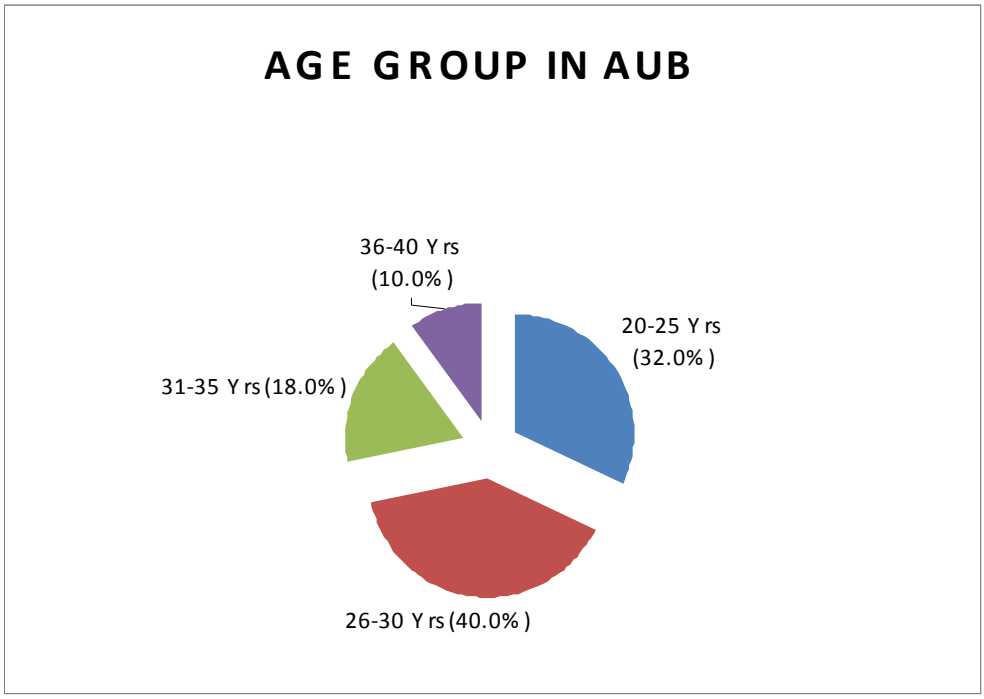

AGE GROUP IN AUB
36-40 Y rs
(10.0%)
20-25 Y rs
(32.0%)
31-35 Y rs (18.0%)
26-30 Y rs (40.0%)

Table 2: Parity and AUB

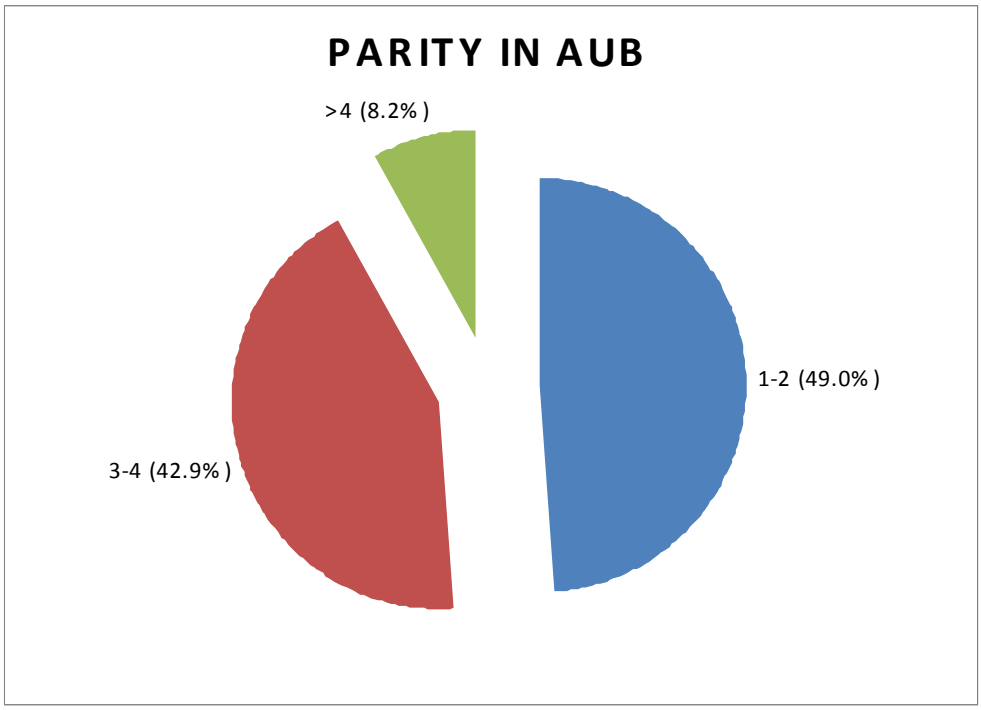
PARITY	Number	%
1-2	24	48
3-4	21	42
>4	5	10
Total	50	100.0

Patients having 1 – 2 children constitute the majority - 48% of cases ; whereas multiparous women having more than 4 children constitute only 10%.

Table 3: Prominent pattern of bleeding

PATTERN OF BLEEDING	Number	%
Polymenorrhea	16	32
Menorrhagia	21	42
Poly Menorrhagia	8	16
Metorrhagia	5	10
Total	50	100

Commonest pattern of bleeding is menorrhagia accounting for 42% of cases.


PARITY IN AUB
>4 (8.2%)
1-2 (49.0%)
3-4 (42.9%)

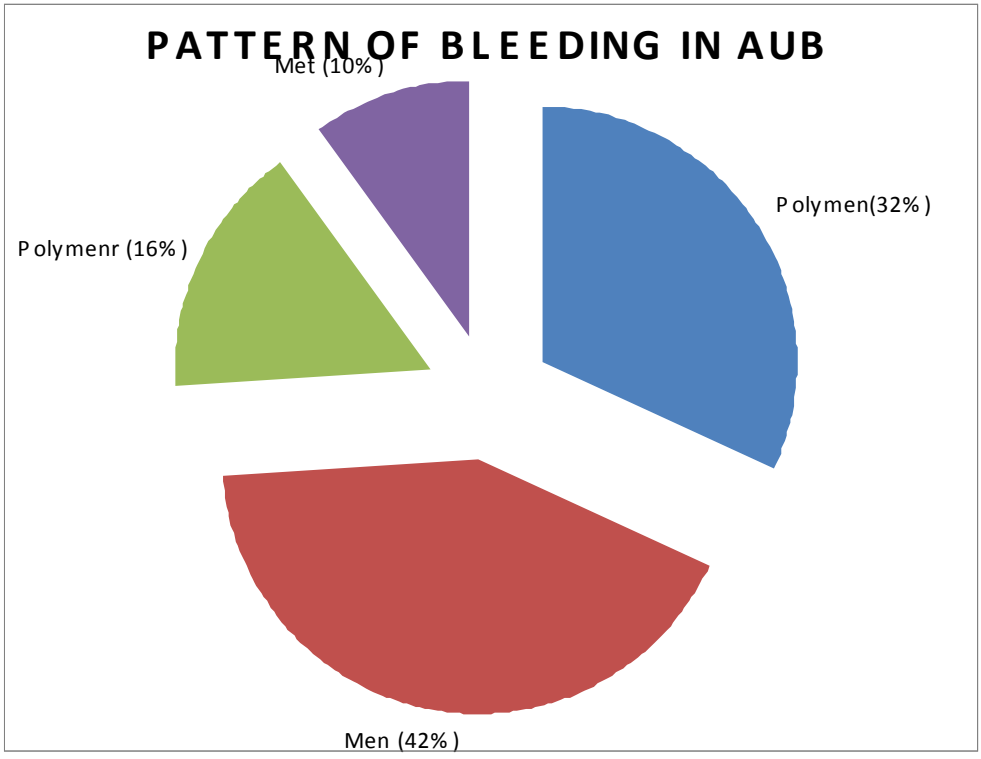

PATTERN OF BLEEDING IN AUB
Met (10%)
Polymen(32%)
Polymenr (16%)
Men (42%)

Table 4: Duration of illness

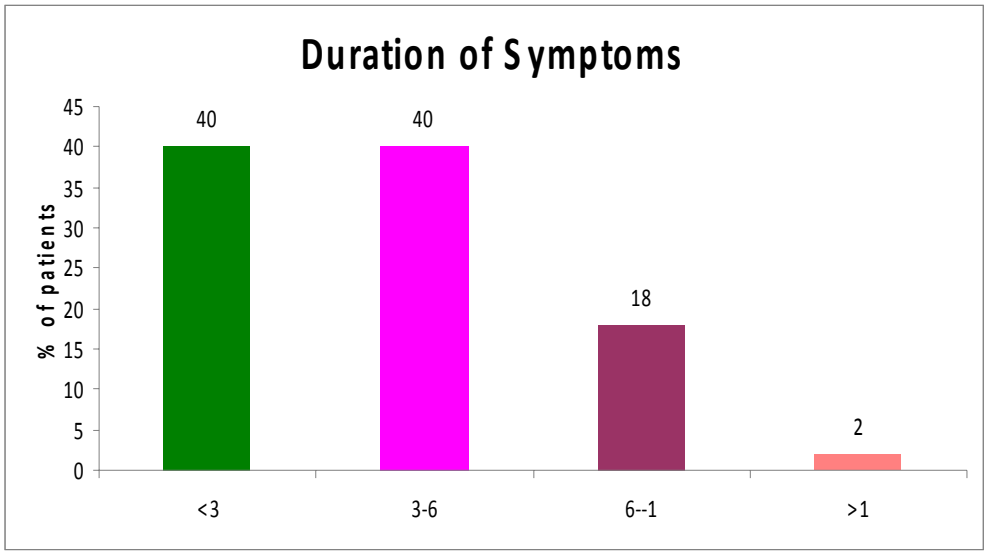
DURATION OF ILLNESS	Number	%
<3	20	40
3-6	20	40
6—1	9	18
>1	1	2
	50	100

80% of patients sought medical advice within 6 months of illness; whereas only 2% of patients sought the medical advice after 1 year of illness.

Table 5: Evaluation by Histo Pathological Examination (HPE)

HPE	Number	%
Proliferative	21	42
Secretory	16	32
Hyperplasia (simple)	4	8
Endocervical Polyp	7	14
Submucous Fibroid	2	4
Total	50	100.0

By Histopathology 37 patients (74%) had normal endometrium. Histopathology diagnosed 4 cases of hyperplasia and 7 cases of endometrial polyp, 2 cases of Submucous fibroid.


Duration of Symptoms
% of patients
45
40
35
30
25
20
15
10
5
0
40
40
18
2
<3
3-6
6--1
>1

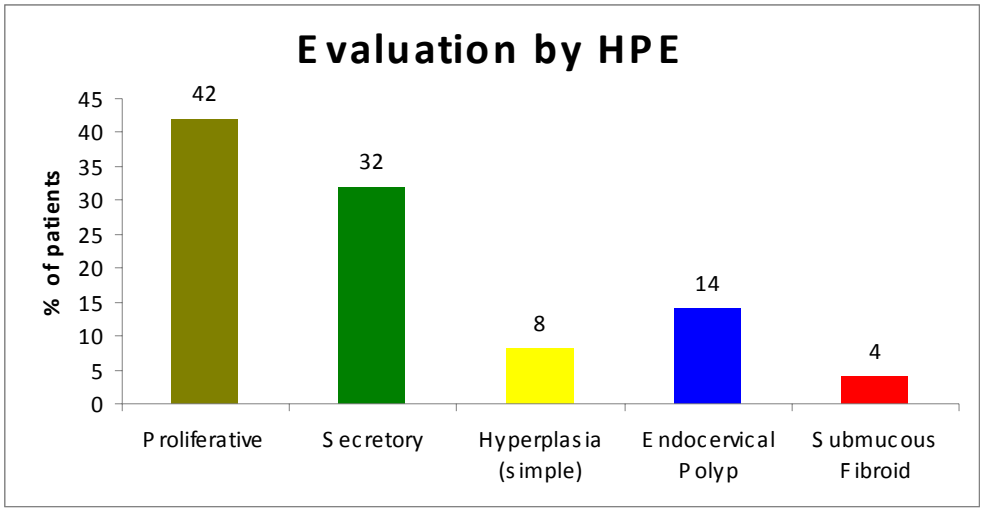

Evaluation by HPE
% of patients
45
40
35
30
25
20
15
10
5
0
42
32
8
14
4
Proliferative
Secretory
Hyperplasia (simple)
Endocervical Polyp
Submucous Fibroid

Table 6: Evaluation by Hysteroscopy

HYSTEROSCOPY	Number	%
Normal study	39	78
Hyperplasia (simple)	2	4
Endocervical Polyp	7	14
Submucous Fibroid	2	4
Total	50	100.0

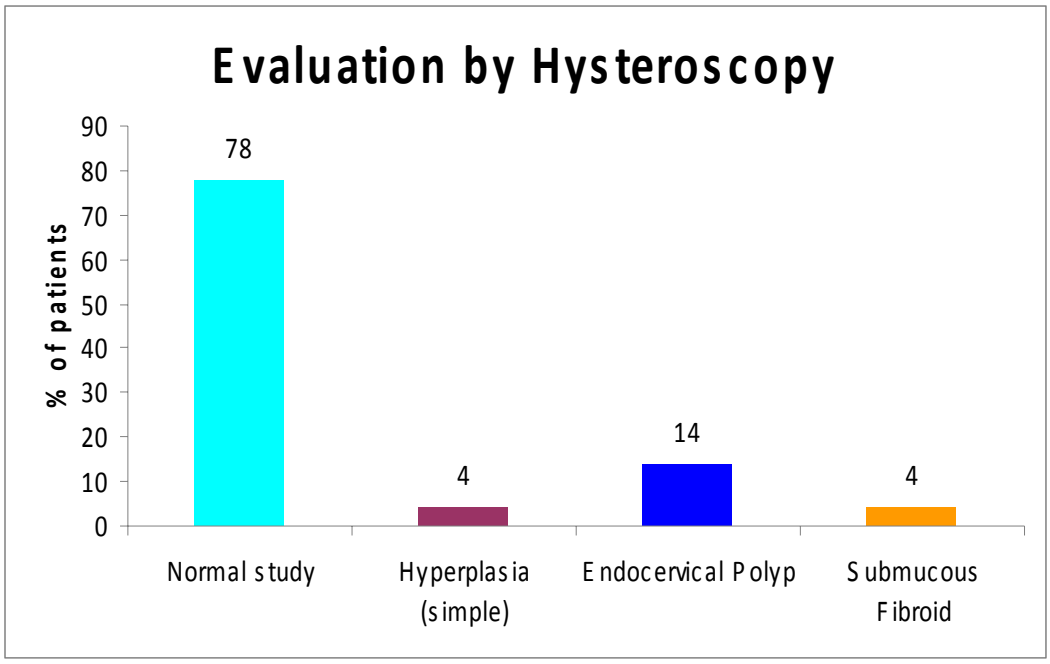
Abnormal findings were seen in 11 patients (22%), while in the remaining 39 patients (78%), no abnormality was detected.

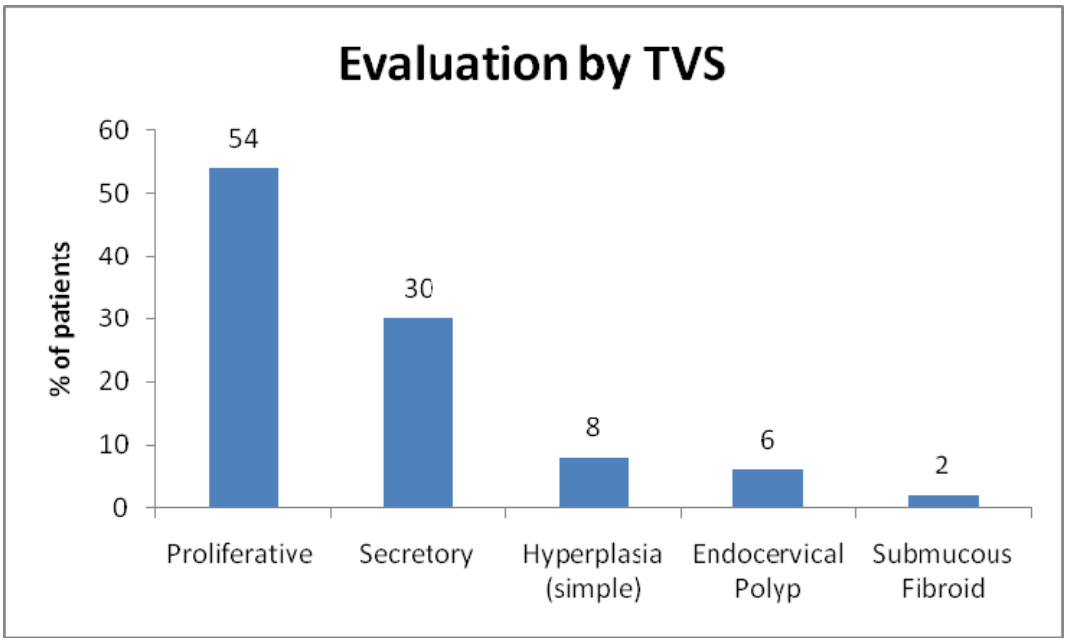
Table: 7 Evaluation by Transvaginal ultrasonography (TVS)

TVS	Number	%
Proliferative	27	54
Secretory	15	30
Hyperplasia (simple)	4	8
Endocervical Polyp	3	6
Submucous Fibroid	1	2

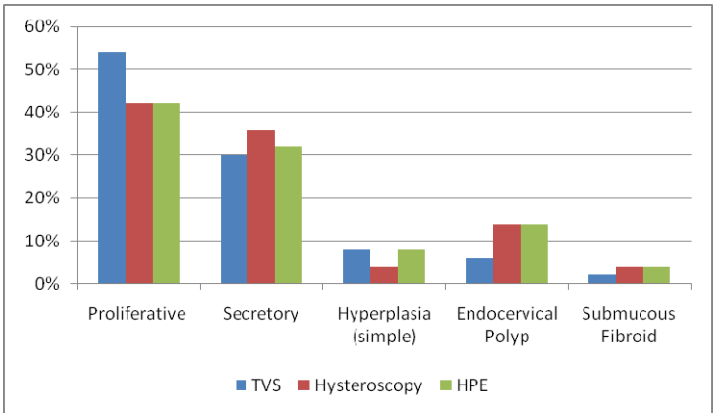
Total	50	100.0

In the present study there were no malignancies detected. 4 out of 50 patients had simple hyperplasia, whereas in 37 out of 50 patients, endometrium was normal.


Evaluation by Hysteroscopy
% of patients
90
80
70
60
50
40
30
20
10
0
78
4
14
4
Normal study
Hyperplasia (simple)
Endocervical Polyp
Submucous Fibroid


Evaluation by TVS
% of patients
60
50
40
30
20
10
0
54
30
8
6
2
Proliferative
Secretory
Hyperplasia (simple)
Endocervical Polyp
Submucous Fibroid

Comparison of Endometrial study by HPE, Hysteroscopy , TVS



VALIDITY OF HYSTEROSCOPY

	Disease Actually		
Hysteroscopy	Present	Absent	
Positive	10 (a)	1 (b)	11(a+b)
Negative	3 (c)	36 (d)	39 (c+d)
	13 (a+c)	37 (b+d)	50

Sensitivity	(a/(a+c))x100	76.90
Specificity	(d/(d+b))x100	97.30
Positive Predictive Value	(a/(a+b))*100	90.90
Negative Predictive Value	(d/(d+c)*100	92.30
False Positive rate	(b/(b+d))*100	2.70
False negative rate	(c/(a+c))*100	23.07
Concordance (Accuracy)	((a+d)/(a+b+c+d))*100	92

VALIDITY OF TVS

	Disease Actually		
TVS	Present	Absent	
Positive	7 (a)	1(b)	8 (a+b)
Negative	5 (c)	37 (d)	42 (c+d)
	12 (a+c)	38 (b+d)	50

Sensitivity	(a/(a+c))x100	58.3
Specificity	(d/(d+b))x100	97.4
Positive Predictive Value	(a/(a+b))*100	87.5
Negative Predictive Value	(d/(d+c)*100	88.1
False positive rate	(b/(b+d))*100	2.63
False negative rate	(c/(a+c))*100	41.66
Concordance (Accuracy)	((a+d)/(a+b+c+d))*100	88%

COMPARISON OF VALIDITIES

	Hysteroscopy	TVS
Sensitivity	76.9	58.3
Specificity	97.3	97.4
Positive Predictive Value	90.9	87.5
Negative Predictive Value	92.3	88.1

DISCUSSION

In the present study "A comparative study of hysteroscopy and transvaginal ultra sonography in the evaluation of AUB in reproductive age group" diagnostic hysteroscopy and TVS were performed followed by Curettage or removal of intrauterine pathology like Submucous myoma, Polyps in 50 consecutive cases of AUB and its correlation with histopathological findings were sought.

PATIENT CHARACTERISTICS

Age group: The age group in this study was between 22 to 40 years and the maximum incidence was between was between 26 to 30 years. **Panda**[49] found that maximum age incidence was between 35-45yrs in range between 25-70yrs. In **Gianninoto**'s[22] series, age range was 38-80yrs and commonest incidence was between 30-45yrs. **Trotsenburg**[50] reported maximum age incidence between 41-50yrs.

Mojgan Barati et al , Sara Mashihi[26] **et al** reported maximum incidence of AUB in more than 40 years age group.

Nabil et al, Peter Slamka[59] **et al** reported maximum incidence in the age group of 30 to 35 years.

Kekelci[51] et al reported 34.3% of incidence in 40 to 50 years age group.

PROMINENT PATTERN OF BLEEDING

The commonest presenting complaint in this series was menorrhagia 42%, followed by Polymenorrhea 32% and polymenorrhagia 16%. **Panda**'s[49] series had 60% cases of menorrhagia followed by Polymenorrhagia and Metrorrhagia.

Tahir MM et al, Bigrigg et al[27]	Menorrhagia 40.75%, PMB 30.75%
Kekelci et al[51]	Menorrhagia 21%, PMB 13.3%, Menometrorrhagia 65.7%
Ameera Takreen et al (2001)	Menorrhagia 53.3%, Polymenorrhagia 6.6%, Polymenorrhea 40%

ABNORMAL FINDINGS

In this study abnormal findings in hysteroscopy were found in 11 patients (22%), while 39 patients (78%), had no abnormality detected.

Table No 8: Normal and Abnormal findings at Hysteroscopy in various series.

Sl. No.	Author (Year)	No. of Cases	Normal (%)	Abnormal (%)
1	Wamsteker (1984) [52]	199	41.5	58.5
2	Gimpelson & Rappold (1988) [53]	276	60	40
3	Loffer (1989) [54]	91	48.66	51.44
4	Sheth (1990) [55]	51	44	56
5	Parasnis (1992) [56]	96	73.95	26.05
6	Neumann (1994) [57]	85	55.2	44.8
7	Panda (1999) [40]	66	46.6	53.4
8	Trotsenburg (2000) [50]	819	66	34
9	Garuti (2001) [18]	1500	61.8	38.2
10	Gianninoto (2003) [22]	512	25	75
11	de Wit AC (2003) [23]	1045	54.2	45.8
12	Present Series	50	78	22

Of the 11 patients with abnormal findings on hysteroscopy, commonest lesion seen was endometrial polyp (7 cases – 14%), followed equally by endometrial hyperplasia and submucous fibroids (2 cases each – 4% each)

Panda[49] found endometrial hyperplasia in 28.3%, **Wamsteker**[52] found endometrial polyp in 19%, endometrial hyperplasia in 12.2% and submucous myoma in 7.8%, **Trotsenburg**[50] observed myomas and polyps in 14% and **deLewit**[23] reported myomas in 21% and polyps in 14.4%.

Hysteroscopy diagnosed endometrial hyperplasia, polyps and myomas with a specificity of 97.3%. **Sheth**[55] reported 81.8 % accuracy in diagnosis of polyps and myomas, while **Garuti**[18] reported 95.4% specificity in diagnosis of polyps.

In 39 cases of normal Hysteroscopic study, 3 abnormal findings were detected on histopathology. They were 2 cases of simple hyperplasia and 1 endometrial polyp.

1 Case of polyp diagnosed by hysteroscopy was later diagnosed to be proliferative endometrium. The detection on intra uterine pathology like endometrium polyp had an accuracy of 57.1%, submucous fibroid had an accuracy of 100% with hysteroscopy. Even though hysteroscopy diagnosed 2 cases as hyperplasia, histopathology showed them to be endometrial polyps.

The accuracy of hysteroscopy in this study was 92%.

Table No 9: Comparison of Accuracy of Hysteroscopy findings in %

Author	Accuracy	Misinterpretation
Baggish (1979) [15]	87.5	12.5
Barbot (1980) [58]	84	16
Sheth (1990) [55]	82	18
Parasnis (1992) [56]	92	8
Panda (1999) [49]	92.69	7.31
Present Series	92	8

Test Used: F Test P=1>0.05 NS

A Statistical analysis of the accuracy obtained by various authors and of the present study shows that there is no significant difference between values.

Table No 10: Comparison of Validity factors Hysteroscopy (in%)

Author	Sensitivity	Specificity	PPV	NPV	Accuracy
Nabil el Tabbakh (All age groups)[59]	75.7	94.6	84.4	91.6	89.8
Nabil el Tabbakh[59] (Premenopausal age)	67.4	94.3	80.6	89.2	87.3
Mojgan Barati[26]	97.8	99	94	99	
Kekelci, Kaya E, Alan M [51]	100	80.5	88.9	100	
Epstein et al [25]	100	84	86.6	94	
Garuti et al [31]	96.5	93.6	92.6		
Jacob et al (2001)	97	82.5			
Paschapoulos (2001)	92	95			
Deuholm (2001)	84	88			
Bonnamy (2002)	78	97			
Present series	76.9	97.3	90.9	92.3	92

Test Used: F Test P=0.3688>0.05 NS

There is no significant difference between sensitivity & specificity obtained in the study and that obtained by various other authors.

TRANS VAGINAL SONOGRAPHY

In this study abnormal findings on TVS were found in 8 patients (16%), while in the remaining 42 patients (84%) no abnormality was detected.

Of the 8 patients with abnormal findings on TVS, commonest seen was endometrial hyperplasia – 4 cases (8%) followed by endometrial polyp–3 cases (6%) and submucous fibroid – 1 case (2%).

TVS diagnosed hyperplasia, endometrial polyp and myomas with a specificity of 97.4%. TVS made a false positive diagnosis of hyperplasia in 1 case, missed the diagnosis of endometrial polyp in 5 cases and submucous fibroid in one case.

It had misdiagnosed 3 cases of polyps, as hyperplasia in 1 case, 1 as normal proliferative endometrium and the other as secretory and misdiagnosed 1 submucous fibroid as polyp.

If saline infusion sonography had been done in addition to TVS, the diagnostic accuracy would have increased since it will delineate polyps and fibroids well.

Table No:11 Comparison of Validity factors - TVS (in%)

Author	Sensitivity	Specificity	PPV	NPV	Accuracy
Nabil el Tabbakh (All age groups)[59]	77	94.6	84.4	91.6	89.8
Nabil el Tabbakh (Premenopausal age) [59]	67.4	94.3	80.6	89.2	87.3
Mojgan Barati[26]	96.8	97	94	78.9	
Epstein et al[25]	49	86	84	88	
Garuti et al (Cut off 4 mm)[31]	95	54.8	63.7		
Garuti et al (Cut off 8 mm)[31]	83.8	81.3	79.4		
Present series	58.3	97.4	87.5	88.1	88

Test Used: F Test P=0.9962>0.05 NS

A comparison of sensitivity and specificity of TVS obtained in the present study with those obtained by other authors show no significant difference between the obtained values.

The complications among patients noted post operatively.

- Vomiting : 10 cases
- Bleeding : 2 cases (due to cervical lip injury by Vulsellum)
- Infection : Nil
- Perforation : Nil

There was no procedure related mortality in this study.

SUMMARY

1. 50 patients presented with AUB underwent TVS, hysteroscopy followed by curettage and removal of pathological lesion

2. Curetted endometrium sent for HPE

3. Age group in this study 20 – 40 years. Maximum incidence was between 26 – 30 years (40%)

4. The commonest presenting complaint was menorrhagia 42% followed by polymenorrhea 32% and polymenorrhagia 16% and metrorrhagia 10%.

5. 80% of patients had symptoms for less than 6 months and only 2% had symptoms for more than one year.

6. Hysteroscopy reported 22% as abnormal as while in 78% no abnormality was detected.

7. The commonest lesion detected by hysteroscopy was endometrial polyp – 14% followed equally by hyperplasia and submucous fibroid (4% each).

8. The sensitivity, specificity, PPV,NPV for hysteroscopy was 76.9%, 97.3%, 90.9% and 92.3% respectively.

9. TVS reported 16% as abnormal findings and in the remaining 84% no abnormality was detected.

10. Most common abnormal lesion detected by TVS was endometrial hyperplasia 8% followed by endometrial polyp 6% and submucous fibroid 2%.
11. The sensitivity, specificity, PPV,NPV for TVS was 58.3%, 97.4%, 87.5% and 88% respectively.
12. Accuracy of hysteroscopy in this study was 92% and that of TVS was 88%.
13. Concordance of hysteroscopy along with curettage was 78% and that of TVS with curettage was 54%
14. No major post operative complications were noted in this study.
15. No procedure related mortality or infectious morbidity was noted in this study.

CONCLUSION

This study confirms that hysteroscopy is superior to transvaginal sonography in evaluating abnormal uterine bleeding.

Hysteroscopy is a safe reliable and quick procedure in the diagnosis of cases with abnormal uterine bleeding with high sensitivity, specificity, positive predictive value, negative predictive value.

Transvaginal sonography can be used as the first line diagnostic technique but hysteroscopy followed by histopathological examination should be considered as “Gold standard” for evaluation of abnormal uterine bleeding.

BIBLIOGRAPHY

1. BAGGISH MS. OPERATIVE HYSTEROSCOPY. IN: ROCK JA, JONES HW III, EDITORS. TELINDE'S OPERATIVE GYNECOLOGY 9TH EDITION. PHILADELPHIA: LIPPINCOTT WILLIAMS & WILKINS; 2003. P. 379-411.
2. LINDEMANN HJ. ONE HUNDRED YEARS OF HYSTEROSCOPY: 1869-1969. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P.128-131.
3. PANTALEONI D. ON ENDOSCOPIC EXAMINATION OF THE CAVITY OF THE WOMB. MED PRESS CIRC 1869; 8: 26
4. NITZE M. UBER EINE NEUE BELEUCHTUNGSMETHODE DER HOHLEN DES MENSCHLICHEN KORPERS. WIEN MED PRESSE 1879; 20: 851
5. BEUTNER O. UGER HYSTEROSKOPIE. ZENTRALBL GYNAEKOL 1898; 22: 580

6. HEINEBERG A. UTERINE ENDOSCOPY: AN AID TO PRECISION IN THE DIAGNOSIS OF INTRAUTERINE DISEASE. SURG GYNECOL OBSTET 1914; 18: 513

7. RUBIN IC. UTERINE ENDOSCOPY, ENDOMETROSCOPY WITH THE AID OF UTERINE INSUFFLATION. AM J OBSTET GYNECOL 1925; 10: 313

8. GAUSS CL. HYSTEROSKOPIE. ARCH GYNAEKOL 1928; 18: 133

9. SEGOND R. HYSTEROSCOPE. BULL FED SOC OBSTET GYNECOL 1934; 23: 709

10. NORMENT WB. A STUDY OF THE UTERINE CANAL BY DIRECT OBSERVATION AND UTEROGRAM. AM J SURG 1943; 60: 56

11. MOHRI T, MOHRI C. HYSTEROSCOPY. WORLD GYNECOL OBSTET 1954; 6: 48

12. ENGLUND S, INGELMAN-SUNDBERG A, WESTIN B. HYSTEROSCOPY IN DIAGNOSIS AND TREATMENT OF UTERINE BLEEDING. GYNAECOLOGIA 1957; 143: 217

13. MENKEN FC. ENDOSCOPIC OBSERVATIONS OF ENDOCRINE PROCESSES AND HORMONAL CHANGES. IN SIMPOSIO ESTEROIDES SEXUALES. 1968 BOGOTÁ P24

14. LINDEMANN HJ. THE USE OF CO2 IN THE UTERINE CAVITY FOR HYSTEROSCOPY. INT J FERTIL 1972; 17: 221

15. BAGGISH MS. CONTACT HYSTEROSCOPY: A NEW TECHNIQUE TO EXPLORE THE UTERINE CAVITY. OBSTET GYNECOL 1979; 54: 350

16. HAMOU JE. MICRO HYSTEROSCOPY: A NEW PROCEDURE AND ITS ORIGINAL APPLICATION IN GYNECOLOGY. J REPROD MED 1981; 26: 375

17. BAGGISH MS. A NEW LASER HYSTEROSCOPE FOR ND-YAG ENDOMETRIAL ABLATION. LASERS SURG MED 1988; 8: 248

18. GARUTI G, SAMBRUNI I, COLONNELLI M, LUERTI M. ACCURACY OF HYSTEROSCOPY IN PREDICTING HISTOPATHOLOGY OF ENDOMETRIUM IN 1500 WOMEN. J AM ASSOC GYNECOL LAPAROSC 2001; 8: 207-13

19. MADAN SM, AL-ZUFAIRI ZA. AUB : DIAGNOSTIC VALUE OF HYSTEROSCOPY. SAUDI MED J 2001; 22: 153-6

20. CLARK TJ, DORRIS V, GUPTA JK. ACCURACY OF HYSTEROSCOPY IN THE DIAGNOSIS OF ENDOMETRIAL CARCINOMA AND HYPERPLASIA. J AM MED ASSOC 2002; 228 PT 3: 1610-621

21. BAIN C, PARK DE, COOPER KG. IS OUTPATIENT DIAGNOSTIC HYSTEROSCOPY MORE USEFUL THAN ENDOMETRIAL BIOPSY ALONE FOR INVESTIGATION OF AUB IN UNSELECTED PREMENOPAUSAL WOMEN? A RANDOMIZED COMPARISON. BR J OBSTET GYNECOL 2002; 109: 805-811

22. GIANNINOTO A, MORANA C, CAMPIONE C. DIAGNOSTIC HYSTEROSCOPY IN AUB. FIVE YEAR'S EXPERIENCE MINERVA GINECOL 2003; 55: 57-61

23. DEWIT AC, VLEUGELS MP, DEKRUIF JH. DIAGNOSTIC HYSTEROSCOPY: A VALUABLE DIAGNOSTIC TOOL IN THE DIAGNOSIS OF STRUCTURAL INTRA-CAVITAL PATHOLOGY AND ENDOMETRIAL HYPERPLASIA OR CARCINOMA? SIX YEAR'S OF EXPERIENCE WITH NON CLINICAL DIAGNOSTIC HYSTEROSCOPY. EUR J OBSTET GYNECOL REPROD BIOL 2003; 110: 79-82

24. JAISWAR SHYAM PAYARI,SACHIN REKHA SRIVASTAVA PK, MONICA PANDEY COMPARATIVE DIAGNOSTIC EVALUATION OF HYSTEROSCOPY, TVS AND HPE IN CASES OF AUB. JOURNAL OF OBSTET AND GYNECOL OF INDIA, VOL: 56, 3 JUN-06 PAGE 240-243
25. EPSTEIN E, RAMIREZ A , SKOOG L - TVS, SIS AND HYSTEROSCOPY FOR THE INVESTIGATION OF WOMEN WITH POST MENOPAUSAL BLEEDING AND ENDOMETRIUM < 5 MMS. – ULTRASOUND OBSTET GYNECOL 2001: 18(2) : 157-162
26. MOJGAN BARATI AND SARA MASIHI : OFFICE HYSTEROSCOPY IN PATIENTS WITH AUB AND NORMAL TVS INTERNATIONAL JOURNAL OF FERTILITY AND STERLITY (IJFS) VOL 1: NO.4 FEB – MAR- 2008 175 -178
27. TAHIRMM, BIGRIGG MA , BROWNING – A RANDOMIZED CONTROL TRIAL COMPARING TVS , OUTPATIENT HYSTEROSCOPY AND ENDOMETRIAL BIOPSY WITH INPATIENT HYSTEROSCOPY AND CURETTAGE. BRITISH JOURNAL OF OBSTET GYNECOL 1999: 106 (12) 1259 – 1264

28. TAJOSSADAT, FERESHTEH, MOHAMMADIZADEH PROSPECTIVE, DESCRIPTIVE, ANALYTIC STUDY OF 105 WOMEN WITH AUB, IRANIAN JOURNAL OF REPRODUCTIVE MEDICINE VOL 15 P 61-64 SPRING 2007

29. ALCAZAR, LAPARTE COMPARATIVE STUDY OF TVS AND HYSTEROSCOPY IN POST MENOPAUSAL BLEEDING. GYNECOL OBSTET INVEST 1996 41-47-49

30. EMANUEL M H, MARION J, VERDEL MJ ET AL , PROSPECTIVE COMPARISON OF TVS AND DIAGNOSTIC HYSTEROSCOPY IN THE EVALUATION OF PATIENTS WITH AUB. AM J OBSTET GYNECOL 1995: 172 ; 547 – 552.

31. 1GARUTI, SAMBRUNI I, CELLANI F, - HYSTEROSCOPY AND TVS IN POST MENOPAUSAL WOMEN WITH UTERINE BLEEDING, INTERNATIONAL JOURNAL OF OBSTET GYNECOL 1999: 65(1) 25-33

32. DIAA EL MOWAFI, AHMED FARID, AHMED EL BADANI COMPARATIVE STUDY OF TVS AND HYSTEROSCOPY WITH HISTOPATHALOGICAL RESULTS D&C BIOPSIES, GENEVA FOUNDATION OF MEDICAL EDUCATION AND RESEARCH 1996.

33. JONES K D, JERMY K, BOURNE TH, WHAT IS THE CORRECT PRIMARY DIAGNOSTIC TOOL IN THE "ONE-STOP" CLINIC FOR THE INVESTIGATION OF AUB.GYNECOL ENDOSCOPY: 11:27-32

34. VAN DER PAS H. INSTRUMENTS. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P. 51-4

35. MARLESCHKI V. CONTACT HYSTEROSCOPY WITH THE UNIVERSAL 4MM HYSTEROSCOPE. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P.58-62

36. GALLINET A. CARBON DIOXIDE HYSTEROSCOPY: PRINCIPLES AND PHYSIOLOGY. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P.45-47

37. MARLOW JL. MEDIA AND DELIVERY SYSTEMS. OBSTET GYNECOL CLIN NORTH AM 1995; 22(3):409-422

38. LUCIANO AA. POWER SOURCES. OBSTET GYNECOL CLIN NORTH AM 1995; 22(3): 423-443

39. VALLE RF. INDICATIONS. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P.21-24

40. LOFFER FD. CONTRAINDICATIONS AND COMPLICATIONS OF HYSTEROSCOPY. . OBSTET GYNECOL CLIN NORTH AM 1995; 22(3): 445-456

41. SCARSELLI G, MENCAGLIA L. ECHOSCOPY AND MICRO HYSTEROSCOPY FOR THE EVALUATION OF PHYSIOPATHOLOGIC ENDOMETRIAL CHANGES. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P. 82-84

42. DEUTSCHMANN C, LEUKEN RP. HYSTEROSCOPIC FINDINGS IN POSTMENOPAUSAL BLEEDING. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P. 132-134

43. SPEROFF L, FRITZ MA. CLINICAL GYNECOLOGIC ENDOCRINOLOGY AND INFERTILITY. 7TH EDITION. PHILADELPHIA: LIPPINCOTT WILLIAMS & WILKINS; 2005. P. 187-234

44. SIEGLER AM OFFICE HYSTEROSCOPY OBSTET GYNECOL CLIN NORTH AM 1995: 22(3) : 457 - 471

45. SHWAYDER JM. PATHOPHYSIOLOGY OF AUB. OBSTET GYNECOL CLIN NORTH AM 2000; 27(2): 219-234

46. BRENNER PF. DIFFERENTIAL DIAGNOSIS OF AUB. AM J OBSTET GYNECOL 1996; 175(3 PT 2):766-9

47. SPEROFF L, FRITZ MA. CLINICAL GYNECOLOGIC ENDOCRINOLOGY AND INFERTILITY. 7TH EDITION. PHILADELPHIA: LIPPINCOTT WILLIAMS & WILKINS; 2005. P. 531-572

48. CHUONG CJ, BRENNER PF. MANAGEMENT OF AUB. AM J OBSTET GYNECOL 1996; 175(3 PT 2): 787-92

49. PANDA A, PARULEKAR SV, GUPTA A. DIAGNOSTIC HYSTEROSCOPY IN ABNORMAL UTERINE BLEEDING AND ITS HISTOPATHOLOGICAL CORRELATION. J OBST GYN INDIA 1999; 175: 74-76

50. VANTROTSENBURG M, WIESER F, NAEGLE F. DIAGNOSTIC HYSTEROSCOPY FOR THE INVESTIGATION OF ABNORMAL UTERINE BLEEDING IN PREMENOPAUSAL PATIENTS. CONTRIB GYNECOL OBSTET 2000; 20: 21-26

51. KEKELCI S, KAYA M, ALAN M DIAGNOSTIC VALUE OF HYSTEROCOPY IN AUB COMPARED TO PATHOLOGY REPORTS, IRANIAN JOURNAL OF REPRODUCTIVE MEDICINE VOL. 5 NO. 2 61-64 SPRING 2007

52. WAMSTEKER K. HYSTEROSCOPY IN THE MANAGEMENT OF ABNORMAL UTERINE BLEEDING IN 199 PATIENTS. IN: SIEGLER AM, LINDEMANN HJ, EDITORS. HYSTEROSCOPY: PRINCIPLES AND PRACTICE. PHILADELPHIA: JB LIPPINCOTT; 1984. P. 128-131

53. GIMPELSON RJ, RAPPOLD HO. A COMPARATIVE STUDY BETWEEN PANORAMIC HYSTEROSCOPY WITH DIRECTED BIOPSIES AND DILATATION AND CURETTAGE: A REVIEW OF 276 CASES. AM J OBSTET GYNECOL 1988; 158(3 PT 1): 489-92

54. LOFFER FD. HYSTEROSCOPY WITH SELECTIVE ENDOMETRIAL SAMPLING COMPARED WITH DILATATION AND CURETTAGE FOR ABNORMAL UTERINE BLEEDING: THE VALUE OF NEGATIVE HYSTEROSCOPIC VIEW.OBSTET GYNECOL 1989;73:16-20

55. SHETH SS, NERURKAR NM, MANGESHKAR PS. HYSTEROSCOPY IN ABNORMAL UTERINE BLEEDING. J OBSTET GYN INDIA 1990; 40: 451

56. PARASNIS HB, PARULEKAR SV. SIGNIFICANCE OF NEGATIVE HYSTEROSCOPIC VIEW IN ABNORMAL UTERINE BLEEDING. J POSTGRAD MED 1992; 38: 62-4

57. NEUMANN T, ASTUDILLO J. HYSTEROSCOPIC STUDY IN PATIENTS WITH ABNORMAL UTERINE BLEEDING. REV CHIL OBSTET GYNECOL 1994; 59: 349-52

58. BARBOT J, PARENT B. CONTACT HYSTEROSCOPY: ANOTHER METHOD OF ENDOSCOPIC EXAMINATION OF THE UTERINE CAVITY. AM J OBSTET GYNECOL 1980; 136: 721

59. M NABIL EL, TABBAKH AND PETER SLAMKA COMPARATIVE STUDY OF TVS, SHG, HSG AND OPERATIVE HYSTEROSCOPY IN PREDICTING ENDOMETRIAL HYPERGLASIA. SOURCE: OBGYN.NET

60. FRASER , IS, CRITCHLEY, MUNRO MG, BRODES M – PROCESS DESIGNED TO LEAD TO INTERNATIONAL AGREEMENT ON TERMINOLOGIES AND DEFINITIONS USED TO DESCRIBE ABNORMALITIES OF MENSTRUAL BLEEDING – FERTIL STERIL 2007: 87: 466

ANNEXURE 1

PROFORMA

NAME : AGE :

IP NO : EDUCATION :

OCCUPATION :

D.O.A : S. E. STATUS :

D.O.OP : ADDRESS :

D.O.D :

COMPLAINTS:

AM

ML

MH- PRESENT

PAST CONTRACEPTION :

NO OF CHILDREN : L.C.B :

STERILIZATION DONE/NOT L.M.P :

PAST HISTORY:

H/O D&C

TUBAL LIGATION/ IUCD

H/O DIABETES

H/O HORMONE THERAPY

H/O BLEEDING DISORDERS

H/O ANTICOAGULANT DRUGS

H/O TUBERCULOSIS

H/O HYPO OR HYPERTHYROIDISM

OBSTETRIC HISTORY:

FAMILY HISTORY: H/O BLEEDING DISORDERS

DRUG HISTORY: HORMONES FOR DUB

GENERAL EXAMINATION:

VITAL DATA **PR:** **BP:**

ABDOMINAL EXAMINATION:

BIMANUAL PELVIC EXAMINATION:

UTERUS-SIZE SHAPE:

CONSISTENCY: SURFACE:

CONTOUR: MOBILITY:

ADNEXAE:

SPECULUM EXAMINATION:

P/V EXAMINATION:

INVESTIGATIONS:

HAEMOGRAM –

URINE – ALB, SUGAR, MICRO :

BLOOD GROUPING RH TYPING :

URINE C/S :

THYROID FUNCTION TESTS :

X– RAY CHEST :

E.C.G :

U.S.G :

OTHER INVESTIGATIONS :

CLINICAL DIAGNOSIS:

HYSTEROSCOPY FINDINGS:

CERVIX :

ENDOCERVIX :

ISTHMUS :

ENDOMETRIAL CAVITY :

ENDOMETRIUM :

RIGHT CORNU :

RIGHT TUBAL OSTIUM :

LEFT CORNU :

LEFT TUBAL OSTIUM :

ENDOVAGINAL SONOGRAPHY

THICKNESS OF THE ENDOMETRIUM

PRESENCE OF CERVICAL / INTRA UTERINE LESIONS:

DIMENSIONS:

HISTOPATHOLOGICAL REPORT

ABBREVIATION

TVS	-	Transvaginal sonography
HPE	-	Histopathological Examination
AUB	-	Abnormal Uterine Bleeding
D&C	-	Dilatation and Curettage
RCOG	-	Royal College of obstetricians and gynecologists
ACOG	-	American College of obstetricians and gynecologists
3D	-	3 Dimension
CO_2	-	Carbondioxide
PPV	-	Positive predictive value
NPV	-	Negative predictive value
SIS	-	Saline infusion sonography
PMB	-	Post menopausal bleeding
HRT	-	Harmone replacement therapy
BT	-	Bleeding time
CT	-	Clotting time